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**READ THIS MANUAL CAREFULLY**

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REV. 06051401

# SERVICE MANUAL
# HS400

HISUN™
GRAB SOME SUN

# Brief introduction to maintenance handbook of HS400UTV

The handbook is edited by Technical Center of Chongqing Huansong Industries (Group) Co., Ltd., and is supplied to dealers and technicians as a document of technique.

This manual gives methods to check, maintain and repair utility terrain vehicles (UTV's), and supplies some relevant techniques and performance data. Some techniques and methods inside may be used to check, maintain and repair other models of UTV, although it is mainly for the HS400UTV.

Please read the handbook through and fully understand it; otherwise, any improper repairing could bring you problems, and or an accident may occur.

Proper use and maintenance can guarantee the UTV being driven safely, reduce its malfunctions, and help the vehicle remain at its best performance level.

The standards, procedures and specifications mentioned in this manual are based on the sample in design, and they are subject to changes according to the product's improvement without prior notice.

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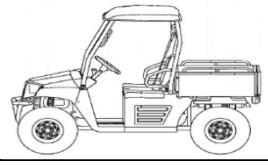
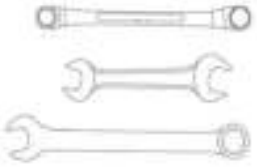
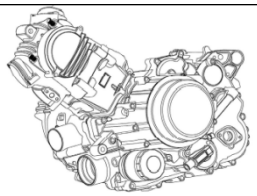
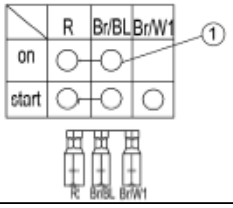
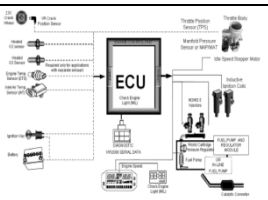
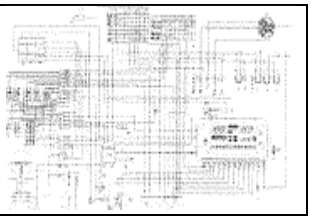
| **Index** | 1.<br>2.<br>3. | **Chapter 1**<br>**General** |  |
| **Chapter 2**<br>**Specifications** | | **Chapter 3**<br>**Periodic Maintenance and Adjustments** |  |
| **Chapter 4**<br>**Engine** |  | **Chapter 5**<br>**Chassis** | |
| **Chapter 6**<br>**Electrical** |  | **Chapter 7**<br>**Engine Management System** |  |
| **Chapter 8**<br>**Troubleshooting** | ??? | Wiring Diagrams |  |

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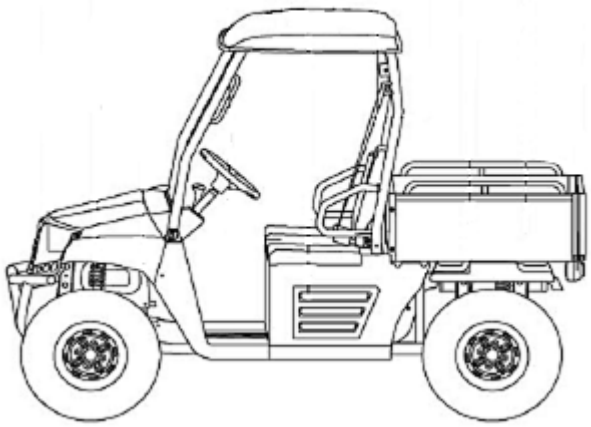
# General

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# General Information

The text provides complete information on maintenance, tune-up repair and overhaul, Hundreds of photographs and illustrations created, during the complete disassembly of four wheel all-terrain vehicles (UTV), guide the reader through every job. All procedures are in step-by-step format and designed for the reader who may be working on the UTV for the first time.

## WARNINGS, CAUTIONS AND NOTES

The terms ***WARNING*, CAUTION** and **NOTE** have specific meaning in this manual.

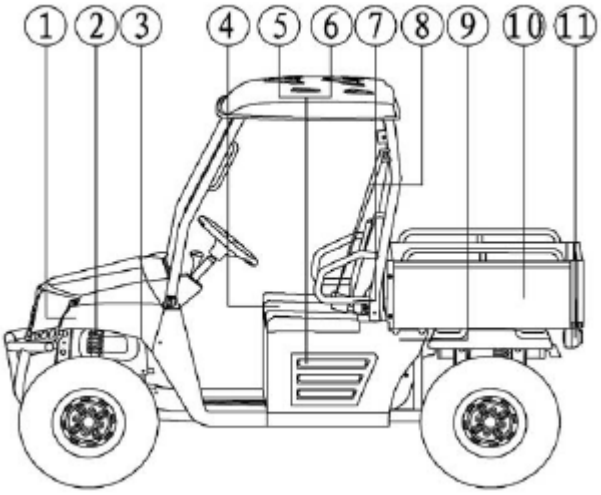
***Warning:*** ***emphasizes areas where injury or even death could result from negligence. Mechanical damage may also occur. Warnings are to be taken seriously.***

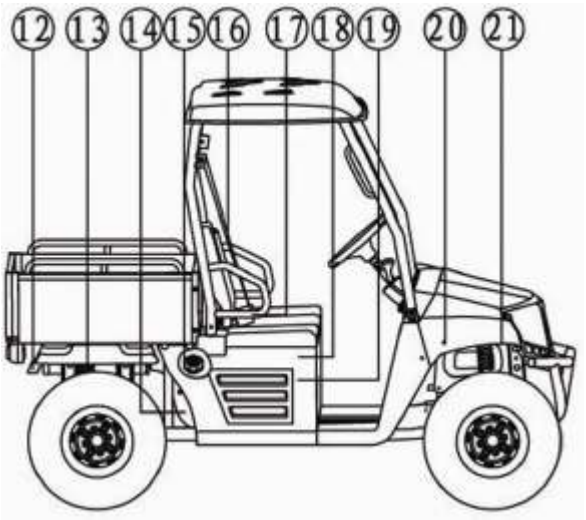
***Caution:*** ***emphasizes areas where equipment damage could result. Disregarding a Caution could cause permanent mechanical damage, though injury is unlikely.***

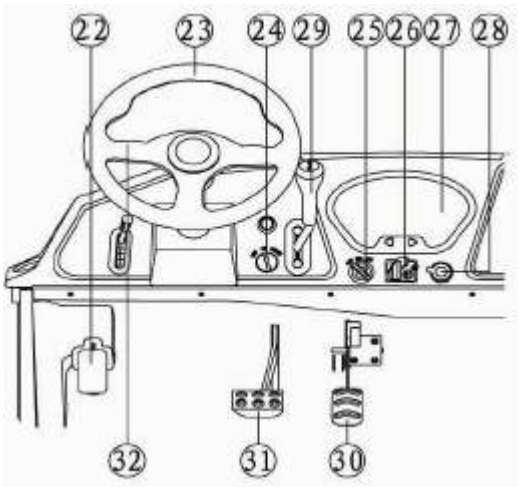
***Note:*** ***provides additional information to make a step or procedure easier or clearer. Disregarding a Note could cause inconvenience, but would not cause equipment damage or injury.***

## Description

1. Headlights
2. Front shock absorber assembly
3. Brake fluid reservoir
4. Driver seat
5. Battery
6. Fuses
7. Left body protection plate
8. Driver seat belt
9. Air filter element
10. Cargo bed
11. Tail/brake lights
12. Spark arrester
13. Rear shock absorber assembly
14. CVT-belt case
15. Fuel tank cap
16. Passenger seat belt
17. Right body protection plate
18. Spark plug
19. Oil filter cartridge
20. Radiator cap
21. Coolant reservoir
22. Parking brake lever
23. Steering wheel
24. Ignition switch
25. Light switch
26. On-Command four-wheel-drive and differential lock switches
27. Multi-function display gauge
28. Auxiliary DC jack
29. Drive select lever
30. Accelerator pedal
31. Brake pedal
32. Release parking handle

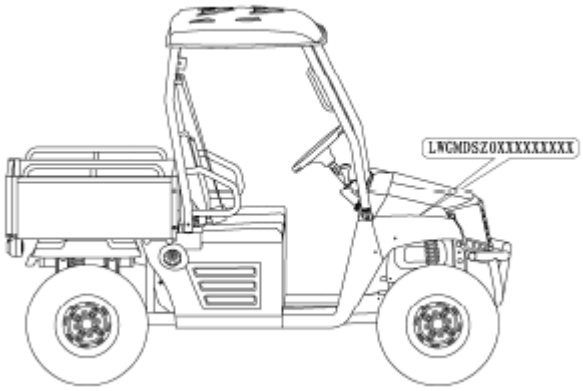



***Note:***
***The vehicle you have purchased may differ slightly from those in the figures of this manual.***

# Identification Code




## Frame No.

Frame No. is carved on the right side of front main frame.

## Engine No.

Engine NO. Is carved on the right side of the engine.

## Safety

Professional mechanics can work for years and never sustain a serious injury or mishap. Follow these guidelines and practice common sense to safely service the utility terrain vehicles.

1. Do not operate the utility terrain vehicle in an enclosed area. The exhaust gasses contain carbon monoxide, an odorless, colorless and tasteless poisonous gas. Carbon monoxide levels build up quickly in small enclosed areas and can cause unconsciousness and death in a short time. Make sure to properly ventilate the work area or operate the UTV outside.

2. Never use gasoline or any extremely flammable liquid to clean parts. Refer to *cleaning parts and handling Gasoline Safely in this section*.

3. Never smoke or use a torch in the vicinity of flammable liquids, such as gasoline or cleaning solvent.

4. If welding or brazing on the UTV, move the fuel tank to a safe distance at least 50ft.(15m) away.

5. Use the correct type and size of tools to avoid damaging fasteners.

6. Keep tools clean and in good condition. Replace or repair worn or damaged equipment.

7. When loosening a tight fastener, be guided by what would happen if the tool slips.

8. When replacing fasteners, make sure the new fasteners are the same size and strength as the original ones.

9. Keep the work area clean and organized.

10. Wear eye protection anytime the safety of the eyes is in question. This includes procedures that involve drilling, grinding, hammering, compressed air and chemicals.

11. Wear the correct clothing for the job. Tie up or cover long hair so it does not get caught in moving equipment.

12. Do not carry sharp tools in clothing pockets.

13. Always have an approved fire extinguisher available. Make sure it is rated for gasoline (Class B) and electrical (Class C) fires.

14. Do not use compressed air to clean clothes, the UTV or the work area. Debris may be blown into the eyes or skin. Never direct compressed air at anyone. Do not allow children to use or play with any compressed air equipment.

15. When using compressed air to dry rotating parts, hold the part so it does not rotate. Do not allow the force of the air to spin the part. The air jet is capable of rotating parts at extreme speed. The part may disintegrate of become damaged, causing serious injury.

16. Do not inhale the dust created by brake pad and clutch wear. These particles may contain asbestos. In addition, some types of insulating materials and gaskets may contain asbestos. Inhaling asbestos particles is hazardous to one's health.

17. Never work on the UTV while someone is working under it.

## Handling Gasoline Safely

Gasoline is a volatile flammable liquid and is one of the most dangerous items in the shop. Because gasoline is used so often, many people forget it is hazardous. Only use gasoline as fuel for gasoline internal combustion engines. Keep in mind when working on the machine, gasoline is always present in the fuel tank, fuel line and carburetor. To avoid a disastrous accident when working around the fuel system, carefully observe the following precautions:

1. Never use gasoline to clean parts. Refer to Cleaning Parts in this section.
2. When working of the fuel system, work outside or in a well-ventilated area.
3. Do not add fuel to the fuel tank or service the fuel system while the UTV is near open flames, sparks or where someone is smoking. Gasoline vapor is heavier than air, it collects in low areas and is more easily ignited than liquid gasoline.
4. Allow the engine to cool completely before working on any fuel system component.
5. Do not store gasoline in glass containers. If the glass breaks, a serious explosion of fire may occur.
6. Immediately wipe up spilled gasoline with rags. Store the rags in a metal container with a lid until they can be properly disposed of, or place them outside in a safe place for the fuel to evaporate.
7. Do not pour water onto a gasoline fire. Water spreads the fire and makes it more difficult to put out. Use a class B, BC or ABC fire extinguisher to extinguish the fire.
8. Always turn off the engine before refueling. Do not spill fuel onto the engine or exhaust system. Do not overfill the fuel tank. Leave an air space at the top of the tank to allow room for the fuel to expand due to temperature fluctuations.

## Cleaning Parts

Cleaning parts is one of the more tedious and difficult service jobs performed in the home garage. Many types of chemical cleaners and solvents are available for shop use. Most are poisonous and extremely flammable. To prevent chemical exposure, vapor buildup, fire and serious injury, observe each product warning label and note the following:

1. Read and observe the entire product label before using any chemical. Always know what type of chemical is being used and whether it is poisonous and/or flammable.
2. Do not use more than one type of cleaning solvent at a time. If mixing chemicals is required, measure the proper amounts according to the manufacturer.
3. Work in a well-ventilated area.
4. Wear chemical-resistant gloves.
5. Wear safety glasses.
6. Wear a vapor respirator if the instructions call for it.
7. Wash hands and arms thoroughly after cleaning parts.
8. Keep chemical products away from children and pets.
9. Thoroughly clean all oil, grease and cleaner residue from any part that must be heated.
10. Use a nylon brush when cleaning parts. Metal brushes may cause a spark.
11. When using a parts washer, only use the solvent recommended by the manufacturer. Make sure the parts washer is equipped with a metal lid that will lower in case of fire.

## Warning Labels

Most manufacturers attach information and warning labels to the UTV. These labels contain instructions that are important to personal safety when operating, servicing, and transporting the UTV. Refer to the owner's manual for the description and location of labels. Order replacement labels from the manufacturer if they are missing or damaged.

## Serial Numbers

Serial and identification numbers are stamped on various locations on the frame, engine and carburetor body. Record these numbers in the Quick Reference Data section in the front of the manual. Have these numbers available when ordering parts.

## Fasteners

Proper fastener selection and installation is important to ensure the UTV operates as designed and can be serviced efficiently. The choice of original equipment fasteners is not arrived at by chance. Make sure replacement fasteners meet all the same requirements as the originals.
Many screws, bolts and studs are combined with nuts to secure particular components.

***Warning:***
***Do not install fasteners with a strength classification lower than what was originally installed by the manufacturer doing so may cause equipment failure and or damage.***

## Torque Specifications

The material used in the manufacturing of the UTV may be subjected to uneven stresses if the fasteners of the various subassemblies are not installed and tightened correctly. Fasteners that are improperly installed or work loose can cause extensive damage. It is essential to use an accurate torque wrench as described in this chapter.

## Self-Locking Fasteners

Several types of bolts, screws and nuts incorporate a system that creates interference between the two fasteners. Interference is achieved in various ways. The most common types are the nylon insert nut and a dry adhesive coating on the threads of a bolt. Self-locking fasteners offer greater holding strength than standard fasteners, which improves their resistance to vibration. All self-locking fasteners cannot be reused. The materials used to form the lock become distorted after the initial installation and removal. Discard and replace self-locking fasteners after removing them. Do not replace self-locking fasteners with standard fasteners.

## Washers

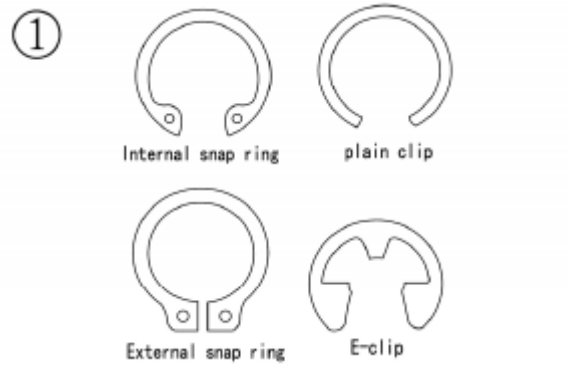
The two basic types of washers are flat washers and lock washers. Flat washers are simple discs with a hole to fit a screw or bolt. Lock washers are used to prevent a fastener from working loose.
Washers can be used as spacers and seals, or can help distribute fastener load and prevent the fastener from damaging the component. As with fasteners, when replacing washers make sure the replacement washers are of the same design and quality.

## Cotter Pins

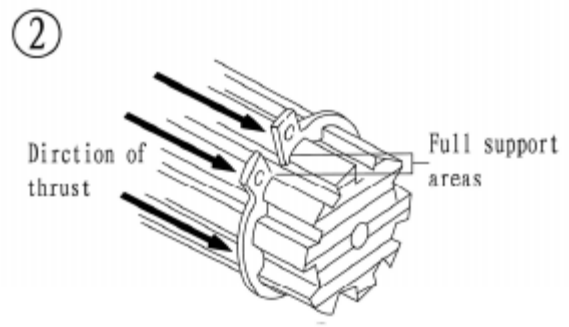
A cotter pin is a split metal pin inserted into a hole or slot to prevent a fastener from loosening. In certain applications, such as the rear axle on an UTV, the fastener must be secured this way. For these applications, a cotter pin and castellated (slotted) nut is used. To use a cotter pin, first make sure the diameter is correct for the hole in the fastener. After correctly tightening the fastener and aligning the holes, insert the cotter pin through the hole and bend the ends over the fastener, Unless instructed to do so, never loosen a tightened fastener to align the holes. If the holes do not align, tighten the fastener enough to achieve alignment.
Cotter pins are available in various diameters and lengths. Measure the length from the bottom of the head to the tip of the shortest pin.

## Snap Rings and E-clips

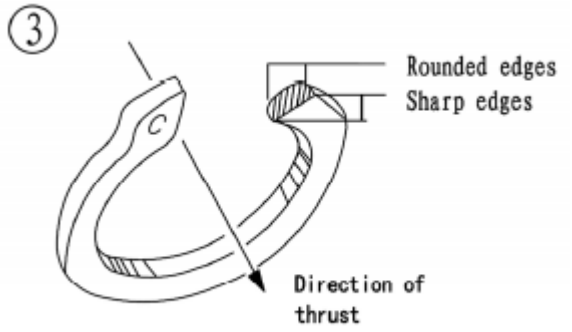
Snap rings (**Figure 1**) are circular-shaped metal retaining clips.




They secure parts in place on parts such as shafts. External type snap rings are used to hold items on shafts. Internal type snap rings secure parts within housing bores. In some applications, in addition to securing the component(s), snap rings of varying thicknesses also determine endplay. These are usually called selective snap rings. The two basic types of snap rings are machined and stamped snap rings. Machined snap rings (**Figure2**) can be installed in either direction.




Because both faces have sharp edges. Stamped snap rings (**Figure3**) are manufactured with a sharp and a round edge. When installing a stamped snap ring in a thrust application, install the sharp edge facing away from the part producing the thrust.




E-clips are used when it is not practical to use a snap ring. Remove E-clips with a flat blade screwdriver by prying between the shaft and E-clip. To install an E-clip, center it over the shaft groove and push or tap it into place. Observe the following when installing snap rings:

1. Remove and install snap rings with snap rings pliers. Refer to *Basic Tools* in this chapter.
2. In some applications, it may be necessary to replace snap rings after removing them.
3. Compress or expand snap rings only enough to install them. If overly expanded, they lose their retaining ability.
4. After installing a snap ring. Make sure it seats completely.
5. Wear eye protection when removing and installing snap rings

# SHOP SIPPLIES

## Lubricants and Fluids

Periodic lubrication helps ensure a long service life for any type of equipment. Using the correct type of lubricant is as important as performing the lubrication service. Although in an emergency the wrong type is better than not using one, The following section describes the types of lubricants most often required. Make sure to follow the manufacturer's recommendations for lubricant types.

## Engine oils

Engine oil for the four-stroke UTV engine is classified by two standards: the American Petroleum Institute (API) service classification and the Society of Automotive Engineers (SAE) viscosity rating Standard classification. The API and SAE information is on all oil container labels. Two letters indicate the API service classification. The number or sequence of numbers and letters (10W-40SG for example) is the oil's viscosity rating. The API service classification and the SAE viscosity index are not indications of the oils quality.
In the API service classification standards, the first letter in the classification S indicates that the oil is for gasoline engines. The second letter indicates the standard the oil satisfies. The classifications are: MA (high friction applications) and MB( low frication applications).

***Note:***
***Refer to Engine Oil and Filter in Chapter Three for further information on API, SAE classifications.***

Always use an oil with a classification recommended by the manufacturer, Using an oil with a different classification can cause engine damage. Viscosity is an indication of the oil's thickness. Thin oils have a lower number while thick oil have a higher number. Engine oils fall into the 5-to 50-weight range for single-grade oils. Most manufactures recommend multi-grade oil. These oils perform efficiently across a wide range of operating conditions. Multi-grade oils are identified by a W after the first number, which indicates the low-temperature viscosity. Engine oils are most commonly mineral (petroleum) based, but synthetic and semi-synthetic types are used more frequently. When selecting engine oil, follow the manufacturer's recommendation for type, classification and viscosity.

## Greases

Grease is lubricating oil with thickening agents added to it. The National Lubricating GreaseInstitute (NLGI) grades grease. Grades range from No.000 to No.6, with No.6 being the thickest. Typical multipurpose grease is NLGI No.2. For specific applications, manufacturers may recommend a water-resistant type grease or one with an additive such as molybdenum disulfide (MoS2).

## Brake fluid

Brake fluid is the hydraulic fluid used to transmit hydraulic pressure (force) to the wheel brakes. Brake fluid is classified by the Department of Transportation (DOT).

Current designations for brake fluid are DOT 3, DOT 4 and DOT 5, this classification appears on the fluid container. Each type of brake fluid has its own definite characteristics. Do not intermix different types of brake fluid as this may cause brake system failure. DOT 5 brake fluid is silicone based. DOT 5 is not compatible with other brake fluids may cause brake system failure. When adding brake fluid, only use the fluid recommended by the manufacturer. Brake fluid will damage any plastic, painted or plated surface it contacts. Use extreme care when working with brake fluid and remove any spills immediately with soap and water. Hydraulic brake systems require clean and moisture free brake fluid. Never reuse brake fluid.
Keep containers and reservoirs properly sealed.

***Warning:***
***Never put a mineral-based (Petroleum) oil into the brake system. Mineral oil causes rubber parts in the system to deteriorate causing complete brake failure.***

## Coolant

Coolant is a mixture of water and antifreeze used to dissipate engine heat. Ethylene glycol is the most common form of antifreeze. Check the UTV Manufacturer's recommendations when selecting antifreeze. Most require one specifically designed for aluminum engines. These types of antifreeze have additives that inhibit corrosion. Only mix antifreeze with distilled water. Impurities in tap water may damage internal cooling system passages.

## Cleaners, Degreasers and Solvents

Many chemicals are available to remove oil, grease and other residue from the UTV. Before using cleaning solvents, consider how they will be used and disposed of, particularly if they are not water-soluble. Local ordinances may restrict types of cleaning chemicals. Refer to Safer in this chapter. Use brake parts cleaner to clean brake system components. Brake parts cleaner leaves no residue. Electrical contact cleaner is a powerful solvent used to remove fuel deposits and varnish from fuel system components. Use this cleaner carefully, as it may damage finishes.
Most solvents are designed to be used with a parts washing cabinet for individual component cleaning. For safety, use only nonflammable or high flash point solvents.

## Gasket Sealant

Sealant is used in combination with a gasket or seal. In other applications, such as between crankcase halves, only a sealant is used. Follow the manufacturer's recommendation when using a sealant. Use extreme care when choosing a sealant, or a different sealant based on its resistance to heat, various fluids and its sealing capabilities.

## Gasket Remover

Aerosol gaskets remover can help remove stubborn gasket. This product can speed up the removal process and prevent damage to the mating surface that may be caused by using a scraping tool. Most of these types of products are very caustic. Follow the gasket remover manufacturer's instructions for use.

## Thread locking Compound

A thread locking compound is a fluid applied to the threads of fasteners. After tightening the fastener, the fluid dries and becomes a solid filler between the threads. This makes it difficult for the fastener to work loose from vibration or expansion and contraction. Use thread locking compound sparingly. Excess fluid can run into adjoining parts.

***Caution:***
**Thread locking compounds are anaerobic and will stress, crack and attack most plastics. Use caution when using these products in areas where there are plastic components.**

Thread locking compounds are available in a wide range of compounds for various strengths, temperature and repair applications. Follow the manufacturer's recommendations regarding compound selection.

## BASIC TOOLS

Most of the procedures in this manual can be carried out with basic hand tools and test equipment familiar to the home mechanic. Always use the correct tools for the job. Keep tools organized and clean. Store them in a tool chest with related tools organized together. Quality tools are essential. The best are constructed of high-strength alloy steel. These tools are light, easy to use and resistant to wear. Their working surface is devoid of sharp edges and carefully polished. They have an easy-to-clean finish and are comfortable to use. Quality tools are a good investment.

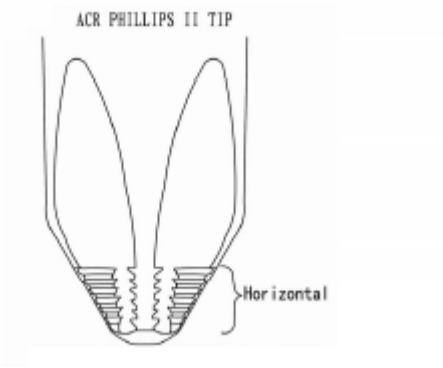
Some of the procedures in this manual specify special tools. In many cases the tool is illustrated in use. Those with a large tool kit may be able to perform procedures. However, in some cases, the specialized equipment or expertise may make it impractical for the home mechanic to attempt the procedure. When necessary, such operations are recommended to have a dealership or specialist perform the task. It may be less expensive to have a professional perform these jobs, especially when considering the cost of equipment. When purchasing tools to perform the procedures covered in this manual, consider the tool's potential frequency of use. If a tool kit is just now being started, consider purchasing a basic tool set from a quality tool supplier that can offer substantial savings when complicated, specialized tools need to be added.

## Screwdrivers

Screwdrivers of various lengths and types are mandatory for the simplest tool kit. The two basic types are the slotted tip (flat blade) and the Phillips tip. These are available in sets that often include an assortment of tip size and shaft lengths. As with all tools, use a screwdriver designed for the job. Make sure of the size of the fastener. Use them only for driving screws. Never use a screwdriver for prying or chiseling metal. Repair or replace worn or damaged screwdrivers. A worn tip may damage the fastener, making it difficult to remove. Phillips-head screws are often damaged by incorrectly fitting screwdrivers. Quality Phillips screwdrivers are manufactured with their crosshead tip machined to Phillips Screw Company specifications.

Poor quality or damaged Phillips screwdrivers can back out (cam out) and round over the screw head. In addition. Weak or soft screw materials can make removal difficult. The best type of screwdriver to use on a Phillips screw is the ACR Phillips II screwdriver, patented by the horizontal anti-cam out ribs found on the driving faces or flutes of the screwdriver's tip (**figure 4**). ACR Phillips II screwdrivers were designed as part of a manufacturing drive system to be used with ACR Phillips II screws. Many tool companies offer ACR Phillips II screwdrivers in different Tip size and interchangeable bits to fit screwdriver bit holders.

④



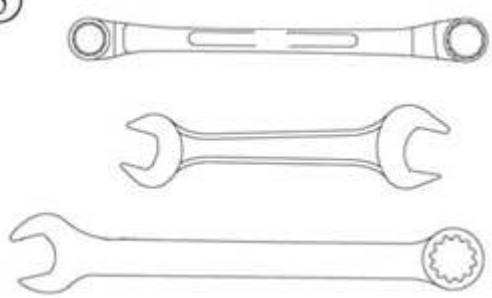

***Note:***

**Another way to prevent cam out and to increase the grip of a Phillips screwdriver is to apply valve grinding compound or permute screw & socket Gripper onto the screwdriver tip. After loosening or tightening the screw, clean the screw recess to prevent engine oil contamination.**

## Wrenches

Open-end, box-end and combination wrenches (**figure 5**) are available in a variety of types and sizes.

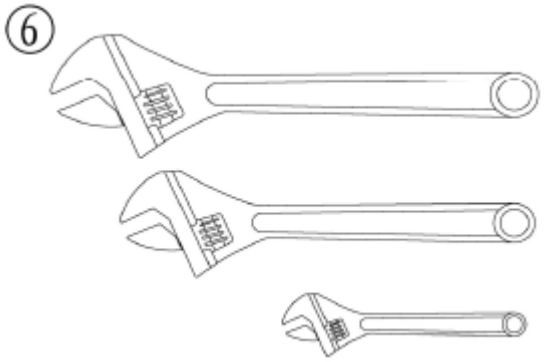
⑤



The number stamped on the wrench refers to the distance of the fastener head. The box-end wrench is an excellent tool because it grips the fastener on all sides. This reduces the chance of the tool slipping. The box-end wrench is designed with either a 6 or 12-point opening. For stubborn or damaged fasteners, the 6-point provides superior holding because it contacts the fastener across a wider area at all six edges. For general use, the 12-point works well. It allows the wrench to be removed and reinstalled without moving the handle over such a wide area. An open-end wrench is fast and works best in areas with limited overhead access. It contacts the fastener at only two points and is subject to slipping if under heavy force, or if the tool or fastener is worn. A box-end wrench is preferred in most instances, especially when braking loose and applying the final tightness to a fastener. The combination wrench has a box-end on one end and an open-end on the other. This combination makes it a convenient tool.

## Adjustable Wrenches

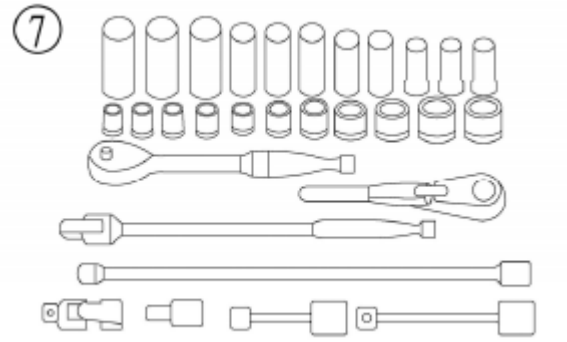
An adjustable wrench or Crescent wrench (**Figure 6**) can fit nearly any nut or bolt head that has clear access around its entire perimeter. An adjustable wrench is best used as a backup wrench to keep a large nut or bolt from turning while the other end is being loosened or tightened with a box-end or socket wrench.

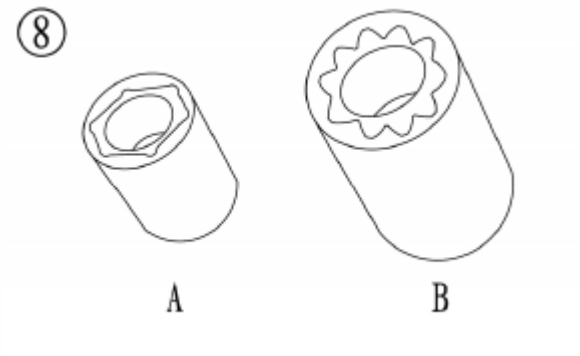



Adjustable wrenches contact the fastener at only two points, which makes them more subject to slipping off the fastener. Because one jaw is adjustable and may become loose, this shortcoming is aggravated. Make certain the solid jaw is the one transmitting the force.

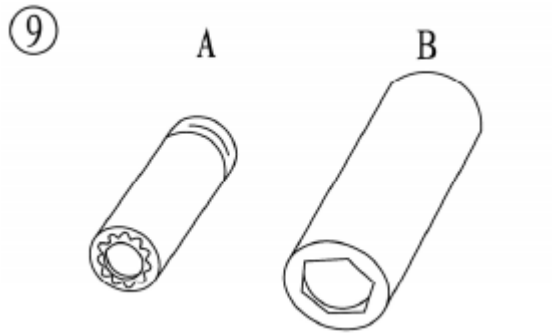
## Socket Wrenches, Ratchets and Handles

Sockets that attach to a ratchet handle (**Figure 7**) are available with 6-point or 12-point openings (**Figure8**) and different drive sizes.




The drive size indicates the size of the square hole that accepts the ratchet handle. The number stamped on the socket is the size of the fastener head. As with wrenches, a 6-point provides superior-holding ability. While a 12-point socket needs to be moved only half as much to reposition it on the fastener. Sockets are designated for either hand or impact use. Impact sockets are made of thicker material for more durability. Compare the size and wall thickness of a 19-mmhand socket (A, **Figure 9**) and the 19-mm impact socket (B). Use impact sockets when using an impact driver or air tools. Use hand sockets with hand-driven attachments.



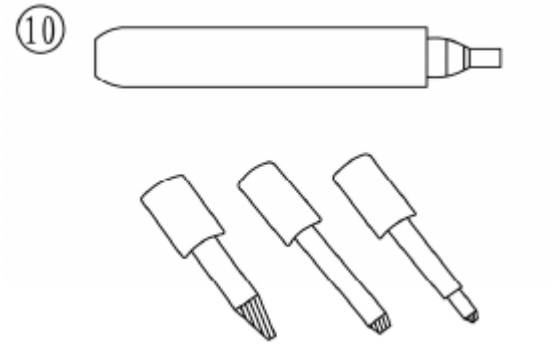

***Warning:***
***Do not use hand sockets with air or impact tools because they may shatter and cause injury. Always wear eye protection when using impact or air tools.***

Various handles are available for sockets. Use the speed handle for fast operation. Flexible ratchet heads in varying length allow the socket to be turned with varying force and at odd angles. Extension bars allow the socket setup to reach difficult areas. The ratchet is the most versatile. It allows the user to install or remove the nut without removing the socket. Sockets combined with any number of drivers make them undoubtedly the fastest, safest and most convenient tool for fastener removal and installation.

## Impact Drivers

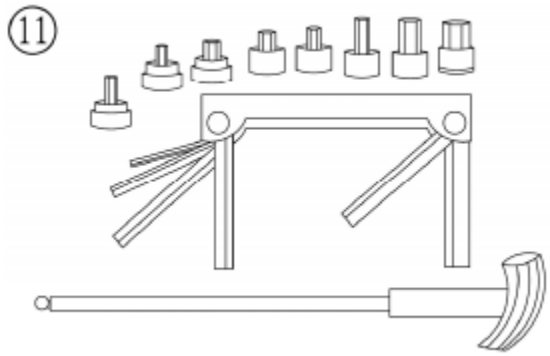
An impact driver provides extra force for removing fasteners by converting the impact of a hammer into a turning motion.
This makes it possible to remove stubborn fasteners without damaging them.

Impact drivers and interchangeable bits (**Figure 10**) are available from most tool suppliers. When using a socket with an impact driver. Make sure the socket is designed for impact use.




## Allen Wrenches

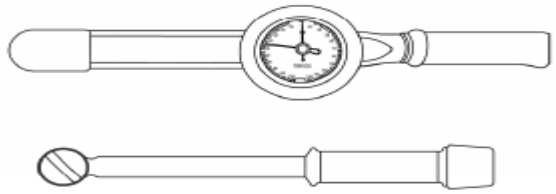
Use Allen or setscrew wrenches (**Figure 11**) on fasteners with hexagonal recesses in the fastener head. These wrenches are available in L-shaped bar, socket and T-handle types. A metric set is required when working on most UTV's. Allen bolts are sometimes called socket bolts.



## Torque Wrenches

Use a torque wrench with a socket, torque adapter or similar extension to tighten a fastener to a measured torque. Torque wrenches come in several drive sizes (1/4, 3/8, 1/2 and 3/4) and have various methods of reading the torque value. The drive size indicates the size of the square drive that accepts the socket, adapter or extension. Common methods of reading the torque value are the deflecting beam, the dial indicator and the audible click (**Figure 12**).

12

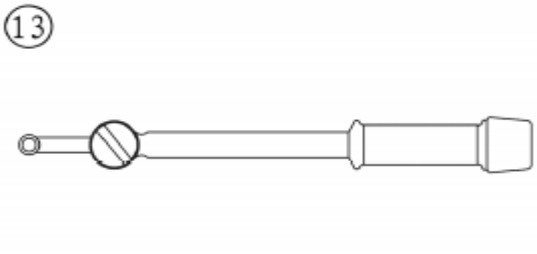


When choosing a torque wrench, consider the torque range, drive size and accuracy. The torque specifications in this manual provide an indication of the range required. A torque wrench is a precision tool that must be properly cared for to remain accurate. Store torque wrenches unloaded in cases or separate padded drawers within a toolbox. Follow the manufacturer's instructions for their care and calibration.

## Torque Adapters

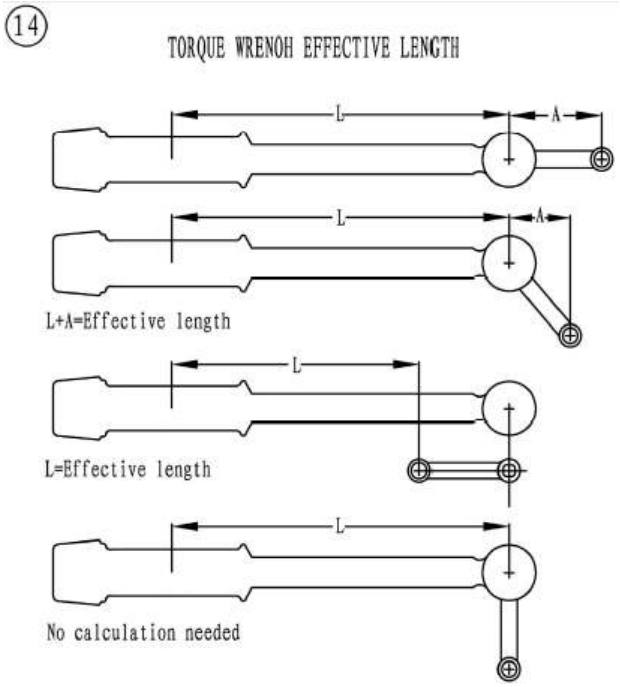
Torque adapters or extensions extend or reduce the reach of a torque wrench. The torque adapter shown in (**Figure 13**) is used to tighten a fastener that cannot be reached because of the size of the torque wrench head, drive, and socket.

13



If a torque adapter changes the effective lever length (**Figure 14**), the torque reading on the wrench will not equal the actual torque applied to the fastener. It is necessary to recalibrate the torque setting on the wrench to compensate for the change of lever length. When using a torque adapter at a right angle to the drive head, calibration is not required, because the effective length has not changed. To recalculate a torque reading when using a torque adapter, use the following formula and refer to **Figure 14:**

14



$$TW = \frac{TA \times L}{L + A}$$

*TW* is the torque setting or dial reading on the wrench. *TA* is the torque specification and the actual amount of torque that is applied to the fastener. *A* is the amount that the adapter increases (or in some cases reduces) the effective lever length as measured along the centerline of the torque wrench. *L* is the lever length of the wrench as measured from the center of the drive to the center of the grip. The effective length is the sum of L and A.
Example:

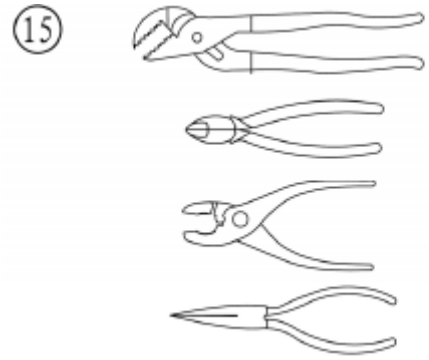
TA=20 ft.-lb.
A=3in.
L=14in.
$TW = \frac{20 \times 14}{14+3} = 280 = 16.5$ ft. - lb.

In this example, the torque wrench would be set to the recalculated torque value (TW = 16.5 ft. –lb). When using a beam-type wrench, tighten the fastener until the pointer aligns with 16.5 ft. –lb. In this example, although the torque wrench is pre set to 16.5 ft. –lb., the actual torque is 20 ft. –lb.

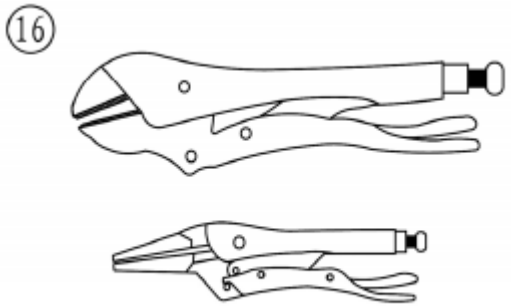
## Pliers

Pliers come in a wide range of types and sizes. Pliers are useful for holding, cutting, bending, and crimping. Do not use them to turn fasteners. **Figure 15** shows several types of useful pliers. Each design has a specialized function. Slip-joint pliers are general – purpose pliers used for gripping and bending.

Diagonal cutting pliers are needed to cut wire and can be used to remove cotter pins. Use needle nose pliers to hold or bend small objects.




Locking pliers (**Figure 16**), sometimes called Vise-Grips, are used to hold objects very tightly. They have many uses ranging from holding two parts together, to gripping the end of a broken stud. Use caution when using locking pliers, as the sharp jaws will damage the objects they hold.

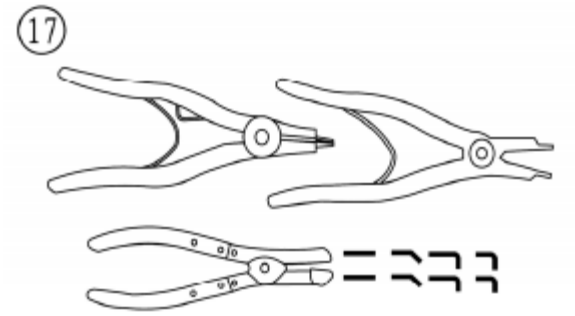


## Snap Ring Pliers

Snap ring pliers are specialized pliers with tips that fit into the ends of snap rings to remove and install them.

***Warning:***
***Snap rings can slip and fly off when removing and installing them. Also, the snap ring pliers tips may break. Always wear eye protection when using snap ring pliers.***

Snap ring pliers (**Figure 17**) are available with a fixed action (either internal or external ) or convertible (one tool works on both internal and external snap rings). They may have fixed tips or interchangeable ones of various sizes and angles. For general use, select a convertible type snap ring plier with interchangeable tips (**Figure 17**).



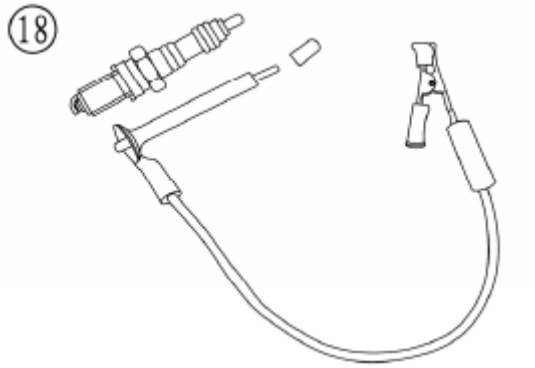

## Hammers

Various types of hammers are available to fit a number of applications. Use a ball-peen hammer to strike another tool, such as a punch or chisel.

Use soft-faced hammers when a metal object must be/struck without damaging it. Never use a metal-faced hammer on engine and suspension components because damage occurs in most cases. Always wear eye protection when using hammers. Make sure the hammer face is in good condition and the handle is not cracked. Select the correct hammer for the job and make sure to strike the object squarely. Do not use the handle or the side of the hammer to strike an object.

## Ignition Grounding Tool

Some test procedures require turning the engine over without starting it. To prevent damage to the ignition system from excessive resistance or the possibility of fuel vapor being ignited by an open
spark, remove the spark plug cap and ground it directly to a good engine ground with the tool shown in (**Figure 18**)**.**




Make the tool shown from a No.6 screw and nut, two washers, length of tubing, alligator clip, an electrical eyelet and a length of wire.

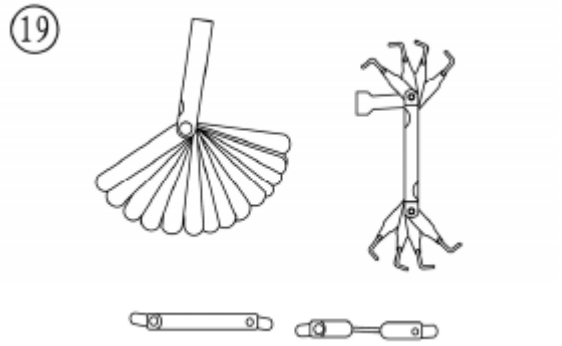
## PRECISION MEASURING TOOLS

The ability to accurately measure components is essential to perform many of the procedures described in this manual. Equipment is manufactured to close tolerances, and obtaining consistently accurate measurements is essential to determine which components require replacement or further service. Each type of measuring instrument is designed to measure a dimension with a certain degree of accuracy and within a certain range. When selecting the measuring tool, make sure it is applicable to the task. As with all tools, measuring tools provide the best results if cared for properly. Improper use can damage the tool and cause inaccurate results. If any measurement is questionable, verify the Measurement, using another tool. A standard gauge is usually provided with micrometers to check accuracy and calibrate the tool if necessary. Precision measurements can vary according to the experience of the person performing the procedure. Accurate results are only possible if the mechanic possesses a feel for using the tool. Heavy-handed use of measuring tools produces less accurate results. Hold the tool gently by the fingertips to easily feel the point at which the tool contacts the object. This feel for the equipment produces more accurate measurements and reduces the risk of damaging the tool or component. Refer to the following sections for specific measuring tools.

### Feeler Gauge

Use feeler or thickness gauges (**Figure19**) for measuring the distance between two surfaces.

19

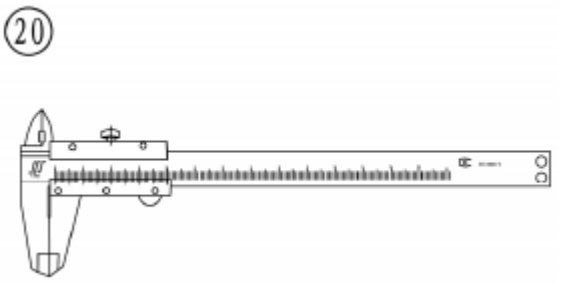


A feeler gauge set consists of an assortment of steel strips of graduated thickness. Each blade is marked with its thickness. Blades can be of various lengths and angles for different procedures. A common use for a feeler gauge is to measure valve clearance. Use wire (round) type gauges to measure spark plug gap.

### Calipers

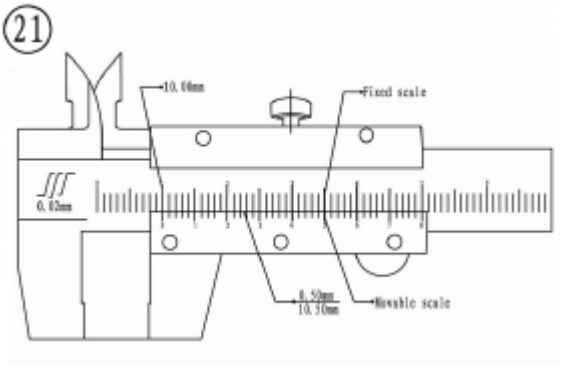
Calipers (**Figure 20**) are excellent tools for obtaining inside, outside and depth measurements.

20



Although not as precise as a micrometer, they allow reasonable precision, typically to within 0.05 mm (0.001 in.). Most calipers have a range up to 150 mm (6 in). Calipers are available in dial, venire or digital versions. Dial calipers have a dial readout that provides convenient reading. Venire calipers have marked scales that must be compared to determine the measurement.
The digital caliper uses a liquid-crystal display (LCD) to show the measurement. Properly maintain the measuring surfaces of the caliper. There must not be any dirt or burrs between the tool and the object being measured. Never force the caliper to close around an object. Close the caliper around the highest point so it can be removed with a slight drag. Some calipers require calibration. Always refer to the manufacturer's instructions when using a new or unfamiliar caliper. To read a Vernire Caliper refer to **Figure 21**.

21




The fixed scale is marked in l-mm increments. Ten individual lines on the fixed scale equal 1 cm. The movable scale is marked in 0.05 mm (hundredth) increments. To obtain a reading, establish the first number by the location of the 0 line on the movable scale in relation to the first line to the left on the fixed scale. In this example, the number is 10 mm. To determine the next number, note which of the lines on the movable scale align with a mark on the fixed scale. A number of lines will seem close, but only one will align exactly. In this case, 0.50 mm is the reading to add to the first number. Adding 10 mm and 0.50 mm equals a measurement of 10.50mm.

## Micrometers

A micrometer is an instrument designed for linear measurement using the decimal divisions of the inch or meter (**Figure 22**).

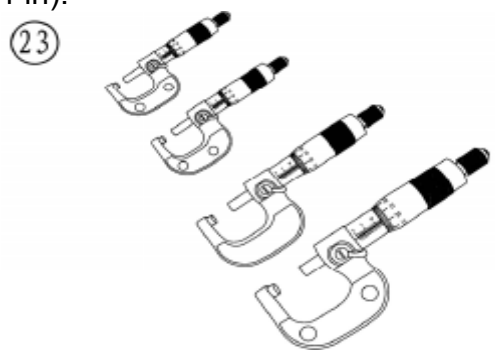
22

DECIMAL PLACE VALUES*

| | | |
|---|---|---|
| 0.1 | Indicates 1/10 (one tenth of an inch or millimeter) | |
| 0.01 | Indicates 1/100 (one one-hundredth of an inch or millimeter) | |
| 0.001 | Indicates 1/1000 (one one-thousandth of an inch or millimeter) | |
| *This chart represents the values of figures placed to the right of the decimal point. Use it when reading decimals from one-tenth to one one-thousandth of an inch or millimeter. It is not a conversion chart (for example: 0.001 in. is not equal to 0.001 mm). | | |

While there are many types and styles of micrometers, most of the procedures in this manual call for an outside micrometer. Use the outside micrometer to measure the outside diameter of round parts and the thickness of materials. A micrometer's size indicates the minimum and maximum size of a part that it can measure. The usual sizes (**Figure 23**) are 0-25mm (0-1 in), 25-50 mm (1-2 in), 50-75 mm (2-3 in) and 75-100 mm (3-4 in).

23



Micrometers that cover a wider range of measurements are available. These use a large frame with interchangeable anvils of various lengths. This type of micrometer offers a cost savings, but its overall size may make it less convenient. When reading a micrometer, numbers are taken from different scales and added together. The following sections describe how to adjust, care for and read the measurements of various types of outside micrometers. For accurate results, properly maintain the measuring surfaces of the micrometer. There cannot be any dirt or burrs between the tool and the measured object. Never force the micrometer to close around an object. Close the micrometer around the highest point so it can be removed with a slight drag.

## Adjustment

Before using a micrometer, check its adjustment as follows:

1. Clean the anvil and spindle faces.

2. To check a 0-1 in. or 0-25 mm micrometer:

- Turn the thimble until the spindle contacts the anvil. If the micrometer has a ratchet stop, use it to ensure that the proper amount of pressure is applied.

- If the adjustment is correct, the 0 mark on the thimble will align exactly with the 0 mark on the sleeve line. If the marks do not align, the micrometer is out of adjustment. Follow the manufacturer's instructions to adjust the micrometer.

3. To check a micrometer larger than 1 in. or 25mm use the standard gauge Supplied by the manufacturer. A standard gauge is a steel block, disc or rod that is machined to an exact size.

- Place the standard gauge between the spindle and anvil, and measure its outside diameter or length. If the micrometer has a ratchet stop, use it to ensure that the proper amount of pressure is applied.

- If the adjustment is correct, the 0 mark on the thimble will align exactly with the 0 mark on the sleeve line. If the marks do not align, the micrometer is out of adjustment.

- Follow the manufacturer's instructions to adjust the micrometer.

## Care

Micrometers are precision instruments. They must be used and maintained with great care. Note the following:

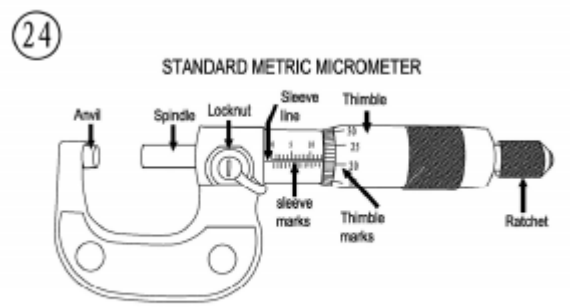
1. Store micrometers in protective cases or separate padded drawers in a tool box.

2. When in storage, make sure the spindle and anvil faces do not contact each other or another object. If they do, temperature changes and corrosion may damage the contact faces.

3. Do not clean a micrometer with compressed air. Dirt forced into the tool will cause wear.

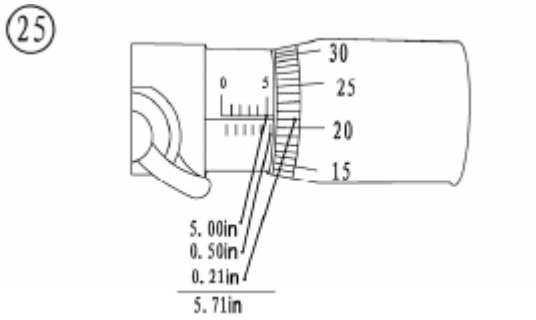
## Metric micrometer

The standard metric micrometer (**Figure 24**) is accurate to one one-hundredth of a millimeter (0.01mm).




The sleeve line is graduated in millimeter and
half millimeter increments. The marks on the upper half of the sleeve line equal 1.00 mm. Each fifth mark above the sleeve line is identified with a number. The number sequence depends on the size of the micrometer. A 0-25 mm micrometer, for
example, will have sleeve marks numbered 0
through 25 in 5 mm increments. This numbering sequence continues with larger micrometers. On all metric micrometers, each mark on the lower half of the sleeve equals 0.50 mm. The tapered end of the thimble has 50 lines marked around it. Each mark equals 0.01 mm. One complete turn of the thimble aligns its 0 mark with the first line on the lower half of the sleeve line or 0.50mm.

When reading a metric micrometer, add the number of millimeters and half-millimeters on the sleeve line to the number of one one hundredth millimeters on the thimble. Perform the following steps while referring to **Figure 25**.




1. Read the upper half of the sleeve line and count the number of lines visible. Each upper line equals 1mm.

2. See if the half –millimeter line is visible on the lower sleeve line. If so, add 0.50mm to the reading in Step 1.

3. Read the thimble mark that aligns with the sleeve line. Each thimble mark equals 0.01mm.

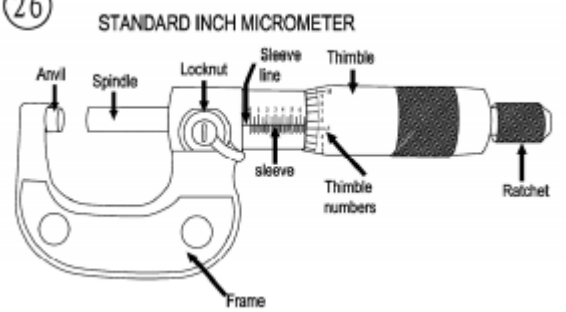
4. Add the readings from Steps 1-3.

***Note:***
**If a thimble mark does not align exactly with the sleeve line. Estimate the amount between the lines. For accurate readings in two-thousandths of a millimeter (0.002mm), use a metric vernier micrometer.**

## Standard Inch Micrometer

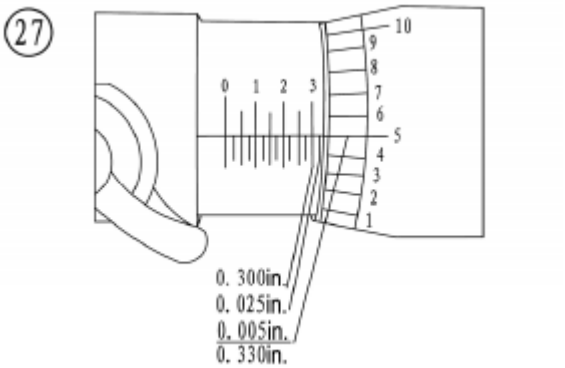
The standard inch micrometer (**Figure 26**) is
accurate to one-thousandth of an inch or 0.001. The sleeve is marked in 0.025 in. increments. Every fourth sleeve mark is numbered 1,2,3,4,5,6,7,8,9. These numbers indicate 0.100, 0.200, 0.300, and so on.
The tapered end of the thimble has 25 lines marked around it. Each mark equals 0.001 in. One complete turn of the thimble will align its zero mark with the first mark on the sleeve or 0.025 in.

26




To read a standard inch micrometer, perform the following steps and refer to **Figure 27**.

27




1. Read the sleeve and find the largest number visible. Each sleeve number equals 0.100 in.

2. Count the number of lines between the numbered sleeve mark and the edge of the thimble. Each sleeve mark equals 0.025 in.

3. Read the thimble mark that aligns with the sleeve line. Each thimble mark equals 0.01 in.

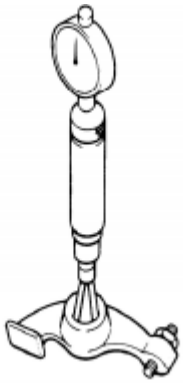
4. Add the readings from Steps 1-3.

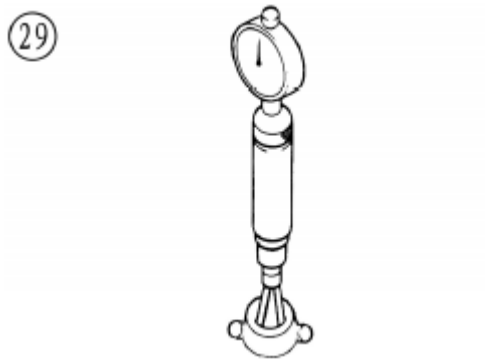
***Note:***
***If a thimble mark does not align exactly with the sleeve line, estimate the amount between the lines. For accurate readings in ten-thousandths of an inch (0.0001 in), use a vernier inch micrometer.***

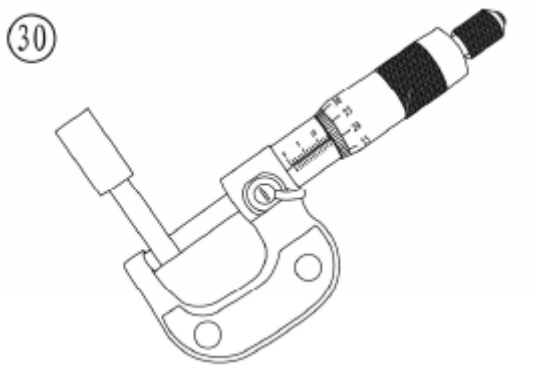
## Telescoping and Small Bore Gauges

Use telescoping gauges (**Figure 28**) and small bore gauges (**Figure 29**) to measure bores. Neither gauge has a scale for direct readings. Use an outside micrometer to determine the reading.

28



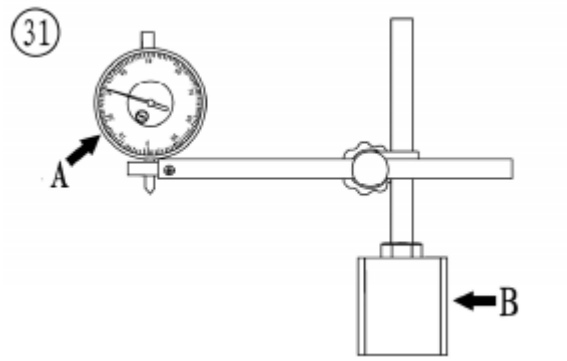



To use a telescoping gauge, select the correct size gauge for the bore. Compress the movable post and. Carefully insert the gauge into the bore. Carefully move the gauge in the bore to make sure it is centered. Tighten the knurled end of the gauge to hold the movable post in position. Remove the gauge and measure the length of the posts. Telescoping gauges are typically used to measure cylinder bores.
To use a small bore gauge, select the correct size gauge for the bore. Carefully insert the gauge into the bore. Tighten the knurled end of the gauge to carefully expand the gauge fingers to the limit within the bore. Do not over tighten the gauge because there is no built-in release. Excessive tightening can damage the bore surface and damage the tool. Remove the gauge and measure the outside dimension (**Figure 30**). Small bore gauges are typically used to measure valve guides.

## Dial Indicator:

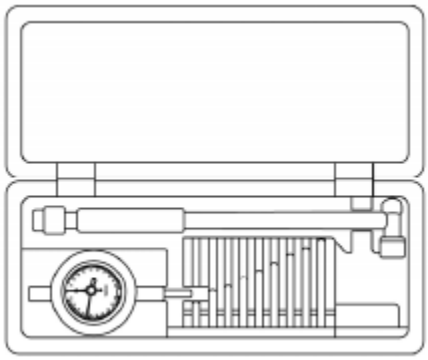
A dial indicator (**Figure 31**) is a gauge with a dial face and needle used to measure variations in dimensions and movements. Measuring brake rotor runout is a typical use for a dial indicator.
Dial indicators are available in various ranges and graduations and with three basic types of mounting bases: magnetic (B. **Figure 31**). Clamp, or screw-in stud. When purchasing a dial indicator, select one with a continuous dial (A, **Figure 31**).



## Cylinder Bore Gauge

A cylinder bore gauge is similar to a dial indicator. The gauge set shown in **Figure 32** consists of a dial indicator, handle, and different length adapters (anvils) to fit the gauge to various bore sizes. The bore gauge is used to measure bore size, taper and out-of-round. When using a bore gauge, follow the manufacturer's instructions.

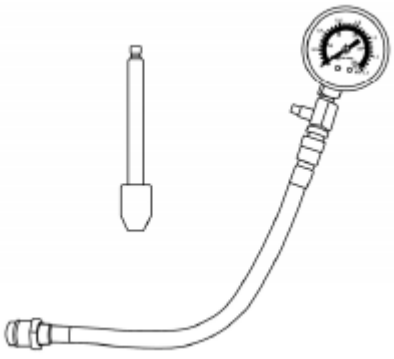
32



## Compression Gauge

A compression gauge **(Figure 33**) measures combustion chamber (cylinder) pressure, usually in PSI or kg/ cm2 .

33

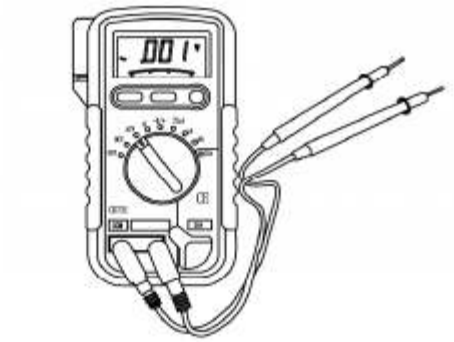


The gauge adapter is either inserted or screwed into the spark plug hole to obtain the reading. Disable the engine so it does not start and hold the throttle in the wide-open position when performing a compression test An engine that does not have adequate compression cannot be properly tuned. Refer to Chapter Three.

## Multimeter

A multimeter **(Figure 34)** is an essential tool for electrical system diagnosis. The voltage function indicates the voltage applied or available to various electrical components. The ohmmeter function tests circuits for continuity, or lack of continuity, and measures the resistance of a circuit. Some manufacturer's specifications for electrical components are based on results using a specific test meter. Results may vary if using a meter not recommended by the manufacturer.

34



Such requirements are noted when applicable. *Ohmmeter (analog) calibration* Each time an analog ohmmeter is used or if the scale is changed, the ohmmeter must be calibrated

## ELECTRICAL SYSTEM FUNDAMENTALS

A thorough study of the many types of electrical systems used in today's UTV's is beyond the scope of this manual. However, a basic understanding of electrical basics is necessary to perform simple diagnostic tests.

### Voltage

Voltage is the electrical potential or pressure in an electrical circuit and is expressed in volts. The more pressure (voltage) in a circuit the more work can be performed.
Direct current (DC) voltage means the electricity flows in one direction. All circuits powered by a battery are DC circuits.
Alternating current (AC) means the electricity flows in one direction momentarily and then switches to the opposite direction. Alternator output is an example of AC voltage. This voltage must be changed or rectified to direct current to operate in a battery powered system.

### Resistance

Resistance is the opposition to the flow of electricity within a circuit or component and is measured in ohms. Resistance causes a reduction in available current and voltage. Resistance is measured in an inactive circuit with an ohmmeter. The ohmmeter sends a small amount of current into the circuit and measures how difficult it is to push the current through the circuit.

An ohmmeter, although useful, is not always a good indicator of a circuit's actual ability under operating conditions. This is because of the low voltage (6-9 volts) the meter uses to test the circuit. The voltage in an ignition coil secondary winding can be several thousand volts. Such high voltage can cause the coil to malfunction, even though it tests acceptable during a resistance test. Resistance generally. Increases with temperature. Perform all testing with the component or circuit at room temperature. Resistance tests performed at high temperatures may indicate high resistance reading and cause unnecessary replacement of a component.

### Amperage

Amperage is the unit of measurement for the amount of current within a circuit. Current is the actual flow of electricity. The higher the current, the more work can be performed up to a given point. If the current flow exceeds the circuit or component capacity, it will damage the system.

## BASIC SERVICE METHODS

Most of the procedures in this manual are straight forward and can be performed by anyone reasonably competent with tools. However, consider personal capabilities carefully before attempting any operation involving major disassembly.

1. Front, in this manual, riders to the front of the UTV, The front of any component is the end closest to the front the UTV. The left and right sides refer to the position of the parts as viewed by the rider sitting on the seat facing forward.

2. Whenever servicing an engine or suspension component, secure the UTV in a safe manner.

3. Tag all similar parts for location and mark all mating parts for position. Record the number and thickness of any shims when removing them. Identify parts by placing them in sealed and labeled plastic sandwich bags.

4. Tag disconnected wires and connectors with masking tape and a marking pen. Do not rely on memory alone.

5. Protect finished surfaces from physical damage or corrosion. Keep gasoline and other chemicals off painted surfaces.

6. Use penetrating oil on frozen or tight bolts. Avoid using heat where possible. Heat can warp, melt or affect the temper of parts. Heat also damages the finish of paint and plastics.

7. When a part is a press fit or requires a special tool to remove, the information or type of tool is identified in the text. Otherwise, if a part is difficult to remove or install, determine the cause before proceeding.

8. To prevent objects or debris from falling into the engine, cover all openings.

9. Read each procedure thoroughly and compare the illustrations to the actual components before starting the procedure.

10. Recommendations are occasionally made to refer service to a dealership or specialist. In these cases, the work can be performed more economically by the specialist than by the home mechanic.

11. The term replaces means to discard a defective part and replace it with a new part. Overhaul means to remove, disassemble, inspect, measure, repair and/or replace parts as required to recondition an assembly.

12. Some operations require using a hydraulic press. If a press is not available, have these operations performed by a shop equipped with the necessary equipment. Do not use makeshift equipment that may damage the motorcycle.

13. Repairs are much faster and easier if the UTV is clean before starting work. Degrease the UTV with a commercial degreaser; follow the directions on the container for the best results. Clean all parts with cleaning solvent when removing them.

***Caution:***
**Do not direct high-pressure water at steering bearings, fuel hoses, wheel bearings, suspension and electrical components. Water may force grease out of the bearings and possibly damage the seals.**

14. If special tools are required, have them available before starting the procedure. When special tools are required, they are described at the beginning of the procedure.

15. Make diagrams of similar-appearing parts. For instance, crankcase bolts are often not the same lengths. Do not rely on memory alone. Carefully laid out parts can become disturbed, making it difficult to reassemble the components correctly.

16. Make sure all shims and washers are reinstalled in the same location and position.

17. Whenever rotating parts contact a stationary part, look for a shim or washer.

18. Use new gaskets if there is any doubt about the condition of old ones.

19. If using self-locking fasteners, replace them with new ones. Do not install standard fasteners in place of self-locking ones.

20. Use grease to hold small parts in place if they tend to fall out during assembly. Do not apply grease to electrical or brake components.

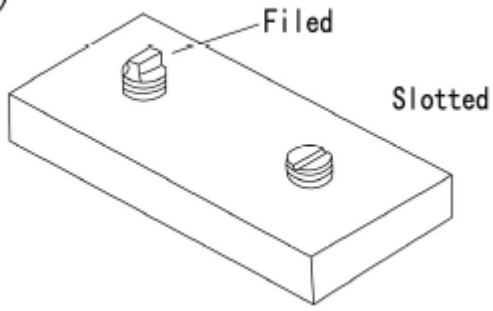
## Removing Frozen Fasteners

If a fastener cannot be removed, several methods may be used to loosen it. First, apply a penetrating fluid. Apply it liberally and let it penetrate for 10-15 minutes. Rap the fastener several times with a small hammer. Do not hit it hard enough to cause damage. Reapply the penetrating fluid if necessary.
For frozen screws, apply penetrating fluid as described, then insert a screwdriver in the slot and rap the top of the screwdriver with a hammer. This loosens the rust so the screw can be removed in the normal way. If the screw head is too damaged to use this method, grip the head with locking pliers and twist the screw out. Avoid applying heat unless specifically instructed. Heat may melt, warp or remove the temper from parts.

## Removing Broken Fasteners

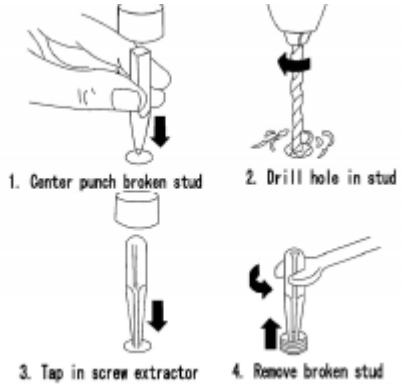
If the head breaks off a screw or bolt, several methods are available for removing the remaining portion. If a large portion of the remainder projects out, try gripping it with locking pliers.
If the projecting portion is too small, file it to fit a wrench or cut a slot in it to fit a screwdriver (**Figure 35**).

35




If the head breaks off flush, use a screw extractor. To do this, center punch the exact center of the remaining portion of the screw or bolt. Drill a small hole in the screw and tap the extractor into the hole. Back the screw out with a wrench on the extractor (**Figure 36**).

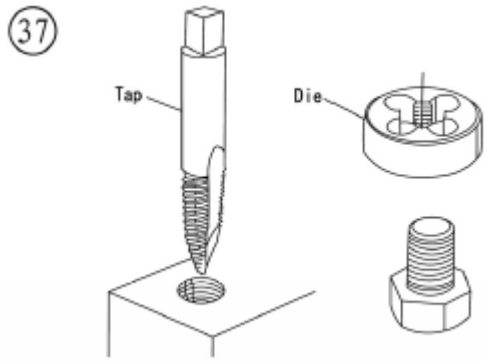
36




## Repairing Damaged Threads

Occasionally, threads are stripped through carelessness or impact damage. Often the threads can be repaired by using a tap (for internal threads on nuts) or a die (for external threads on bolts) (**Figure 37**). To clean or repair spark plug threads, use a spark plug tap.
If an internal thread is damaged, it may be necessary to install a Helicoil or Timesert (types of thread insert). Follow the manufacturer's instructions when installing their insert. If it is necessary to drill and tap a hole, refer to **Table 8** for metric tap and drill sizes.

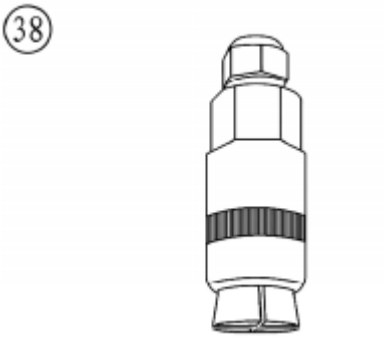
37



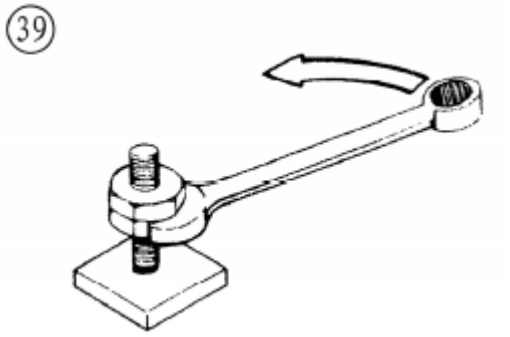

## Stud Removal/Installation

A stud removal tool **(Figure 38)** is available from most tool suppliers. This tool makes the removal and installation of studs easier.

38



If one is not available, thread two nuts onto the stud and tighten them against each other. Remove the stud by turning the lower nut **(Figure 39).**




1. Measure the height of the stud above the surface.
2. Thread the stud removal tool onto the stud and tighten it, or thread two nuts onto the stud.
3. Remove the stud by turning the stud remover or the lower nut.
4. Remove any thread locking compound from the threaded hole. Clean the threads with an aerosol parts cleaner.
5. Install the stud removal tool onto the new stud or thread two nuts onto the stud.
6. Apply thread locking compound to the threads of the stud.
7. Install the stud and tighten with the stud removal tool or the top nut.
8. Install the stud to the height noted in Step 1 or its torque specification.
9. Remove the stud removal tool or the two nuts.

## Removing Hoses

When removing stubborn hoses, do not exert excessive force on the hose or fitting. Remove the hose, do not exert excessive force on the hose or fitting. Remove the hose clamp and carefully insert a small screwdriver or pick tool between the fitting and hose. Apply a spray lubricant under the hose and carefully twist the hose off the fitting. Clean the fitting of any corrosion or rubber hose material with a wire brush Clean the inside of the hose thoroughly. Do not use any lubricant when installing the hose (new or old). The lubricant may allow the hose to come off the fitting, even with the clamp secure.

## Bearings

Bearings are used in the engine and transmission assembly to reduce power loss, heat and noise resulting from friction. Because bearings are precision parts, they must be maintained with proper lubrication and maintenance. If a bearing is damaged, replace it immediately. When installing a new bearing, take care to prevent damaging it.

***Note:***
**Unless otherwise specified, install bearings with the manufacturer's mark or number facing outward.**

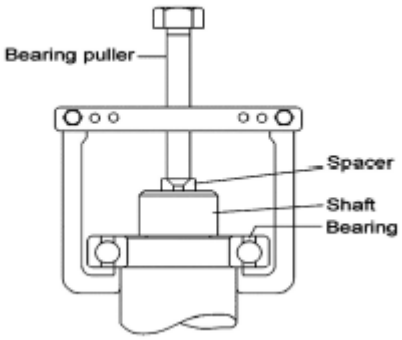
## Removal

While bearing are normally removed only when damaged, there may be times when it is necessary to remove a bearing that is in good condition. However, improper bearing removal will damage the bearing and possibly the shaft or case.

Note the following when removing bearings:

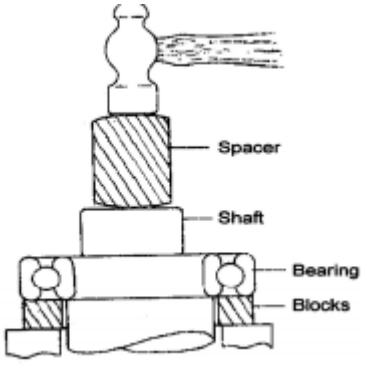
1. When using a puller to remove a bearing from a shaft, take care that the shaft is not damaged. Always place a piece of metal between the end of the shaft and the puller screw. In addition, place the puller arms next to the inner bearing race. See **Figure 40.**

40




2. When using a hammer to remove a bearing from a shaft, do not strike the hammer directly against the shaft. Instead, use a brass or aluminum rod between the hammer and shaft **(Figure 41)** and make sure to support both bearing races with wooden blocks as shown.

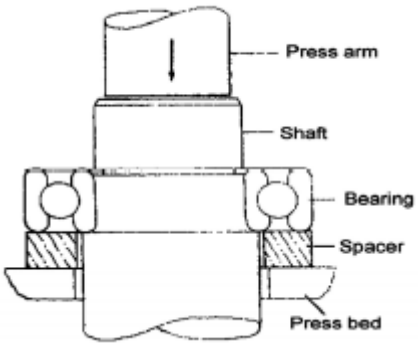
41




3. The ideal method of bearing removal is with a hydraulic press. Note the following when using a press:

   - Always support the inner and outer bearing races with a suitable size wooden or aluminum spacer **(Figure 42).** If only the outer race is supported, pressure applied against the balls and/or the inner race will damage them.

42



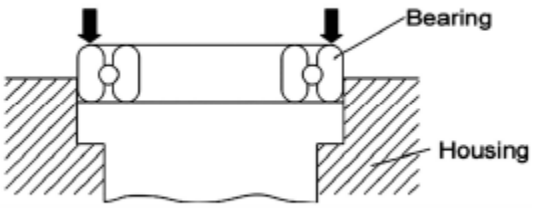

   - Always make sure the press arm **(Figure 42)** aligns with the center of the shaft. If the arm is not centered, it may damage the bearing and/or shaft.

   - The moment the shaft is free of the bearing. It drops to the floor. Secure or hold the shaft to prevent it from falling.

## Installation

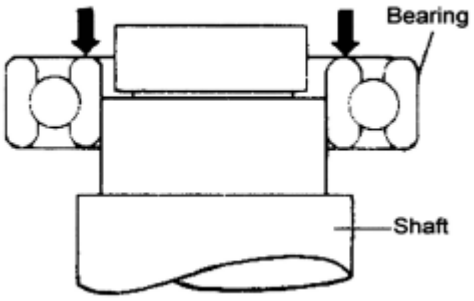
1. When installing a bearing in a housing, apply pressure to the outer bearing race **(Figure 43).**

43




When installing a bearing on a shaft, apply pressure to the inner bearing race **(Figure 44).**

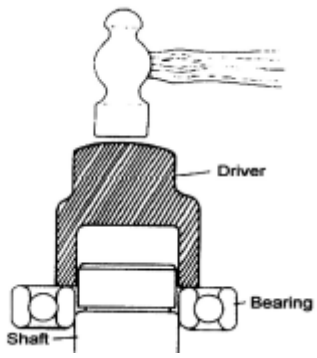
44




2. When installing a bearing as described in Step 1, some type of driver is required. Never strike the bearing directly with a hammer or it will damage the bearing. When installing a bearing, use a piece of pipe or a driver with a diameter that matches the bearing inner race. **Figure 45** Shows the correct way to use a driver and hammer to install a bearing.

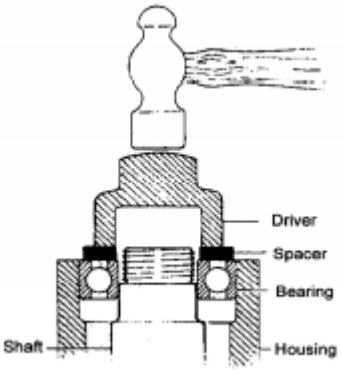
**Figure 45** Shows the correct way to use a driver and hammer to install a bearing.

45




3. Step 1 describes how to install a bearing in a case half or over a shaft, However, when installing a bearing over a shaft and into the housing at the same time, a tight fit is required for both outer and inner bearing races. In this situation, install a spacer underneath the driver tool so that pressure is applied evenly across both races. See **Figure 46.** If the outer race is not supported as shown, the balls will push against the outer bearing race and damage it.

46



## Interference fit

1. Follow this procedure when installing a bearing over a shaft. When a tight fit is required, the bearing inside diameter is smaller than the shaft. In this case. Driving the bearing on the shaft using normal methods may cause bearing damage. Instead, heat the bearing before installation. Note the following:

- Secure the shaft so it is ready for bearing installation.

- Clean all residues from the bearing surface of the shaft. Remove burrs with a file or sandpaper.

- Fill a suitable pot or beaker with clean mineral oil. Place a thermometer rated above 120℃(248°F) in the oil. Support the thermometer so it does not rest on the bottom or side of the pot.

- Remove the bearing from its wrapper and secure it with a piece of heavy wire bent to hold it in the pot. Hang the bearing in the pot so it does not touch the bottom or sides of the pot.

- Turn the heat on and monitor the thermometer. When the oil temperature rises to approximately 120℃(248°F), remove the bearing from the pot and quickly install it. If necessary, place a socket on the inner bearing race and tap the bearing into place.

- As the bearing chills, it will tighten on the shaft, so install it quickly. Make sure the bearing is installed completely.

2. Follow this step when installing a bearing in a housing. Bearings are general installed in a housing with a slight interference fit Driving the bearing into the housing using normal methods may damage the housing or cause bearing damage. Instead, heat the housing before the bearing is installed.

***Caution;***
**Before heating the housing in this procedure, wash the housing thoroughly with detergent and water. Rinse and rewash the cases as required to remove all traces of oil and other chemical deposits.**

- Heat the housing to approximately 100℃ (212°F) in an oven or on a hot plate. An easy way to check that it is the proper temperature is to place tiny drops of water on the housing; if they sizzle and evaporate immediately, the temperature is correct. Heat only one housing at a time.

***Caution:***
***Do not heat the housing with a propane or acetylene torch. Never bring a flame into contact with the bearing or housing. The direct heat will destroy the case hardening of the bearing and will likely warp the housing.***

- Remove the housing from the oven or hot plate, and hold onto the housing with welding gloves. It is hot!

- Hold the housing with the bearing side down and tap the bearing out. Repeat for all bearings in the housing.

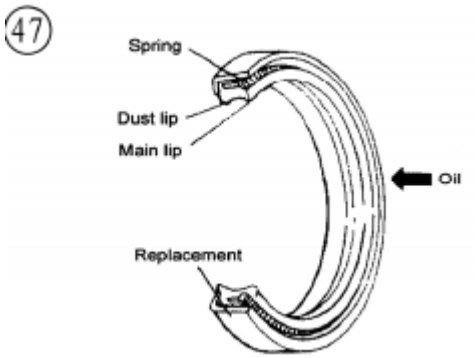
- Before heating the bearing housing, place the new bearing in a freezer if possible. Chilling a bearing slightly reduces its outside diameter while the heated bearing housing assembly is slightly larger due to heat expansion. This makes bearing installation easier.

***Note:***
***Always install bearings with the manufacturer's mark or number facing outward.***

- While the housing is still hot. Install the new bearing(s) into the housing. Install the bearings by hand, if possible. If necessary, lightly tap the bearing(s) into the housing with a driver placed on the outer bearing race (**Figure 43**). Do not install new bearings by driving on the inner-bearing race. Install the bearing(s) until it seats completely.

## Seal Replacement

Seals (**Figure 47**) contain oil, water, grease or combustion gasses in a housing or shaft.




Improperly removing a seal can damage the housing or shaft. Improperly installing the seal can damage the seat.
Note the following:

1. Prying is generally the easiest and most effective method of removing a seal from the housing. However, Always place a rag underneath the pry tool to prevent damage to the housing. Note the seal's installed depth or if it is installed flush.

2. Pack waterproof grease in the seal lips before the seal is installed.

3. In most cases, install seals with the manufacturer's numbers or marks facing out.

4. Install seals with a socket or driver placed on the outside of the seal as shown in. Drive the seal squarely into the housing until it is to the correct depth or flush as noted during removal. Never install a seal by hitting against the top of it with a hammer.

## STORAGE

Several months of non-use can cause a general deterioration of the UTV. This is especially true in areas of extreme temperature variations. This deterioration can be minimized with careful preparation for storage. A properly stored UTV is much easier to return to service.

## Storage Area Selection

When selecting a storage area, consider the following:

1. The storage area must be dry. A heated area is best, but not necessary. It should be insulated to minimize extreme temperature variations.

2. If the building has large window areas, mask them to keep sunlight off the UTV.

3. Avoid buildings in industrial areas where corrosive emissions may be present. Avoid areas close to saltwater.

4. Consider the area's risk of fire, theft or vandalism. Check with an insurer regarding UTV coverage while in storage.

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## Preparing the UTV for Storage

The amount of preparation a UTV should undergo before storage depends on the expected length of non-use, storage area conditions and personal preference. Consider the following list the minimum requirement:

1. Wash the UTV thoroughly. Make sure all dirt, mud and other debris are removed.

2. Start the engine and allow it to reach operating temperature. Drain the engine oil regardless of the riding time since the last service. Fill the engine with the recommended type of oil.

3. Drain the fuel tank, fuel lines and carburetor.

4. Remove the spark plug and ground the ignition system with a grounding tool as described in this chapter. Then pour a teaspoon (15-20ml) of engine oil into the cylinder. Place a rag over the opening and Start the engine over to distribute the oil. Remove the grounding tool and reinstall the spark plug.

5. When the engine has cooled to room temperature, drain the cooling system drain the coolant in the coolant reserve tank and all tank lines.

6. Cover the exhaust and intake opening.

7. Apply a protective substance to the plastic and rubber components. Make sure to follow the manufacturer's instructions for each type of product being used.

8. Place the UTV on a work stands with all wheels off the ground.

9. Cover the UTV with old bed sheets or something similar. Do not cover it with any plastic material that will trap moisture.

## Returning the UTV to Service

The amount of service required when returning a UTV to service after storage depends on the
length of non-use and storage conditions. In addition to performing the reverse of the storage procedure, note the following:

1. Remove the covers from the intake and exhaust openings.

2. Service the air filter

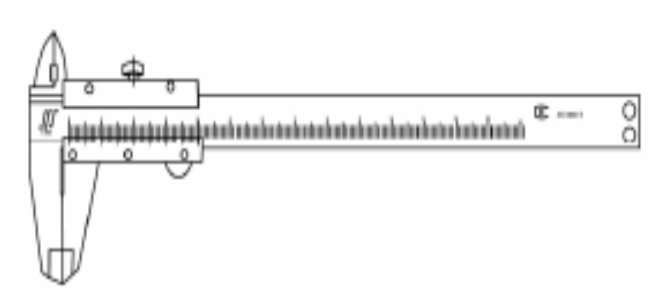
3. Inspect the cooling system. Check the drain plug and hose connections for leaks.

4. Refill the fuel tank. Turn the fuel shutoff valve on and check for fuel leaks.

5. Make sure the brakes, clutch, throttle and engine stop switch work properly before operating the UTV. Evaluate the service intervals to determine which areas require service.

6. If the UTV has been in storage for longer than four months, change the engine oil as and filter, and the transmission oil as described.

# Specifications




| | | | |
|---|---|---|---|
| **Conversion table** | **2-3** | **Engine Torque Specs** | **2-16** |
| **General Specs** | **2-4** | **Chassis Torque Specs** | **2-19** |
| **Engine Specs** | **2-6** | **General Torque Specs** | **2-21** |
| **Chassis Specs** | **2-11** | **Engine Lubrication Points and type of lubricant** | **2-22** |
| **Electrical Specs** | **2-14** | **Chassis Lubrication Points and types of lubricant** | **2-23** |

**（1）How to use conversion table**

All the specified documents in this manual are taken SI and Metric measurements. With the following
conversion table, metric units can be converted into standard units.

Sample:

| METRIC | | MULTIPLY | | STANDARD |
|---|---|---|---|---|
| Mm | | 0.03937 | = | in |
| 2mm | × | 0.03937 | = | 0.08in |

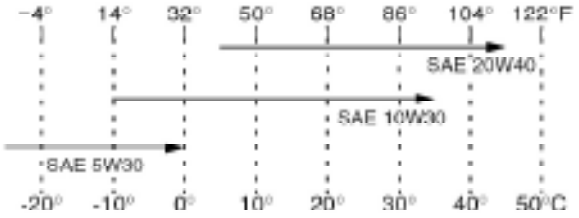
Conversion table

| Conversion between metric and imperial | | | |
|---|---|---|---|
| | Know unit | Multiply | Product |
| Torque | m·kg | 7.233 | ft·lb |
| | m·kg | 86.794 | in·lb |
| | cm·kg | 0.0723 | ft·lb |
| | cm·kg | 0.8679 | in·lb |
| Weight | kg | 2.205 | lb |
| | g | 0.03527 | oz |
| Length | km/hr | 0.6214 | mph |
| | km | 0.6214 | mi |
| | m | 3.281 | ft |
| | m | 1.094 | yd |
| | cm | 0.3937 | in |
| | mm | 0.03937 | in |
| Volume/capacity | cc（$cm^3$） | 0.03527 | oz（IMP liq.） |
| | cc（$cm^3$） | 0.06102 | cu·in |
| | lit（liter） | 0.8799 | qt（IMP liq.） |
| | lit（liter） | 0.2199 | gal（IMP liq.） |
| Others | kg/mm | 55.997 | lb/in |
| | $kg/cm^2$ | 14.2234 | psi（$lb/in^2$） |
| | Centigrade | 9/5（℃）+32 | Fahrenheit（°F） |

**（2）Definition of unit**

| Unit | Read | Definition | Measurement |
|---|---|---|---|
| mm | Millimetre | 1 mm=$10^{-3}$Meter | Length |
| cm | Centimetre | 1 cm =$10^{-2}$Meter | Length |
| kg | Kilogram | 1 kg =$10^3$Gram | Weight |
| N | Newton | 1N=1 kg×meter/second² | Force |
| N.m | Newton meter | 1 Nm=1Newton×1meter | Torque |
| kgf.m | Meter Kilogram | 1 kgf.m =1Meter×1kgf | Torque |
| Pa | Pascal | 1 Pa=1Newton/$1meter^2$ | Pressure |
| N/mm | Newton per millimeter | 1 N/mm =1Newton/millimeter | Rigid of spring |
| L | Litre | — | Volume of capacity |
| $cm^3$ | Cubic centimeter | | |
| r/min | Revolutions per minute | — | Rotational speed |

## General Specifications

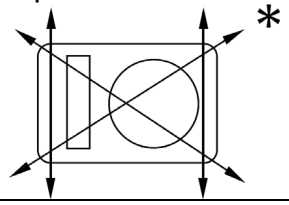
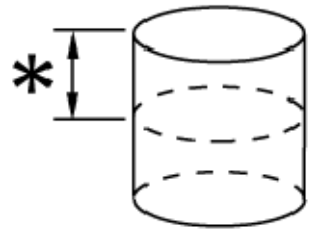
| Item | Standard |
|---|---|
| **Dimensions** | |
| Overall length | 2,680mm (105.5in) |
| Overall width | 1,320mm (52.0 in) |
| Overall height | 1,870mm (73.6in) |
| Seat height | 840mm (33.1in) |
| Wheelbase | 1,830mm (720in) |
| Minimum ground clearance | 300mm (11.8 in) |
| Minimum turning radius | 3,500mm (137.8 in) |
| **Basic Weight** | |
| With oil and full fuel tank | 548kg (1,208 lb) |
| **Engine** | |
| Engine type | Liquid cooled 4-stroke, SOHC |
| Cylinder arrangement | Forward-inclined single cylinder |
| Displacement | 392cm3 |
| Bore × stroke | 84.5×70mm (3.33×2.76in) |
| Compression ratio | 9.3:1 |
| Standard compression pressure (at sea level) | 1,324kPa (13.24kg/cm2,188.31psi) at 850r/min |
| Starting system | Electric starter |
| **Lubrication System** | Wet sump |
| **Oil Type and Grade** | |
| **Engine oil** | API service SE,SF,SG type or higher |
|  | |
| Final gear oil | SAE80 API “GL-4” Hypoid gear oil |
| Differential gear oil | SAE80 API “GL-5” Hypoid gear oil |
| **Oil capacity** | |
| Engine oil | 2.1 L (1.85 Imp qt, 2.22 US qt) |
| Periodic oil change | 1.2 L (1.06 Imp qt, 1.27 US qt) |
| With oil filter replacement | 2.1 L (1.85 Imp qt, 2.22 US qt) |
| Total amount | 2.2 L (1.94 Imp qt, 2.32US qt) |
| Final gear case oil | |
| Periodc oil change | 0.25 L (0.22 Imp qt, 0.26 US qt) |
| Total amount | 0.28 L (0.25 Imp qt, 0.30 US qt) |
| Differential gear case oil | |
| Periodic oil change | 0.32 L (0.28 Imp qt, 0.34 US qt) |

# Specifications

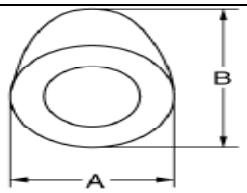
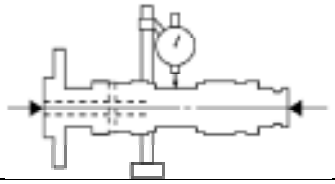
| Item | Standard |
|---|---|
| **Air Filter** | Wet type element |
| **Fuel** | |
| Type | Unleaded gasoline only |
| Fuel tank capacity | 26L (5.72 lmp gal, 6.86 US gal) |
| **Carburetor** | |
| Type/quantity | PD36J-C / 1 |
| **Clutch type** | Wet ,centrifugal automatic |
| **Transmission** | |
| Primary reduction system | V-belt |
| Secondary reduction system | Shaft drive |
| Transmission type | V-belt automatic |
| Operation | Right hand operation |
| Single speed automatic | 2.300～0.700 |
| Reverse gear | 26/15 × 41/21 × 24/18 |
| **Chassis** | |
| Frame type | Steel tube frame |
| Camber angle | 5° |
| Trail | 26.0mm (1.02 in) |
| Toe-in | 0～10 mm (0.00～0.39 in) |
| **Tire** | |
| Type | Tubeless |
| Size Front | 25×8-12 NHS |
| Rear | 25×10-12 NHS |
| Pressure of front wheel | 70kpa ( 10 psi ) |
| Pressure of rear wheel | 70kpa ( 10 psi ) |
| **Brake** | |
| Front brake Type | Dual disc brake |
| Operation | Brake foot Pedal |
| Rear brake Type | Dual disc brake |
| Operation | Brake foot Pedal |
| **Suspension** | |
| Front suspension | Double wishbone |
| Rear suspension | Double wishbone |
| **Shock absorber** | |
| Front shock absorber | Coil spring/oil damper |
| Rear shock absorber | Coil spring/oil damper |
| **Wheel travel** | |
| Front wheel travel | 130 mm (5.12 in) |
| Rear wheel travel | 155 mm 6.10 in) |

| | | | | |
|---|---|---|---|---|
| **Electrical** | | | | |
| Ignition system | C.D.I. (ECU) | | | |
| Generator system | A.C. magneto | | | |
| Battery type | U1-32 | | | |
| Battery capacity | 12 V, 32.0Ah | | | |
| Headlight type | S2 | | | |
| Bulb wattage × quantity | 12V， | 35W/35V | × | 2 |
| Headlight | 12V， | 5W | × | 2 |
| Front Position Light | 12V， | 10W | × | 4 |
| turning light | 12V， | 5W | | |
| License light | 12V， | 21W/5W | × | 2 |
| Rear tail light | LED | | | |
| Neutral | LED | | | |
| Reverse | LED | | | |
| Coolant temperature | LED | | | |
| Parking brake | LED | | | |
| Four-wheel drive | LED | | | |
| Differential gear lock | LED | | | |

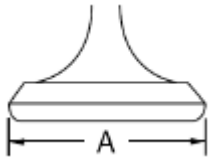
## ENGINE SPECIFICATIONS

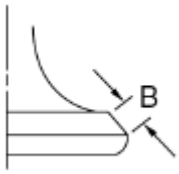
| Item | Metric Standard | Service Wear Limit |
|---|---|---|
| **Cylinder head**<br>Warp limit *<br>  | | 0.03 mm (0.0012 in) |
| **Cylinder**<br>Bore size<br>Measuring point *<br>  | 84.503 -84.527mm (3.327- 3.278in) | |

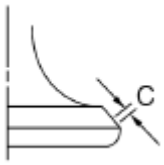
# Specifications

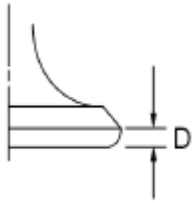
| Item | Metric | Standard | Service Wear Limit |
|---|---|---|---|
| **Camshaft**<br>Drive method<br>Cam dimensions |  | | |
| Intake “A”<br>“B” | 40.88 mm<br>32.30 mm | (1.6094in)<br>(1.2717in) | |
| Exhaust “A”<br>“B” | 40.95 mm<br>32.30 mm | (1.6122in)<br>(1.2717in） | |
| Camshaft run out limit |  | | |
| **Cam chain**<br>No. of links<br>Cam chain adjustment method | 92RH2010J/126M<br><br>Automatic | | |
| **Rocker arm/rocker arm shaft**<br>Rocker arm inside diameter<br>Shaft outside diameter<br>Arm-to-shaft clearance | <br>12.000 -12.018 mm<br>11.973 -11.989 mm<br>0.011- 0.045 mm | <br>(0.4724-0.4731 in)<br>(0.4714-0.4720 in)<br>(0.0004-0.0018 in) | |
| **Valve, valve seat, valve guide**<br>Valve clearance (cold)<br>IN<br><br>EX | <br><br>0.10 - 0.015 mm<br><br>0.15 - 0.20 mm | <br><br>(0.0039 - 0.0059in)<br><br>(0.0059 - 0.0079 in) | |

**Valve Dimensions**



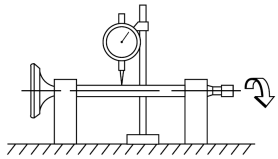



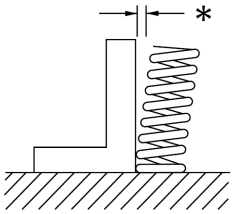
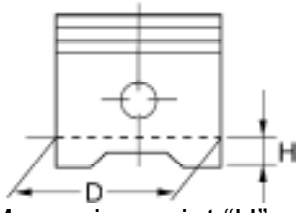



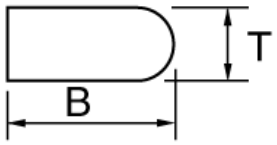
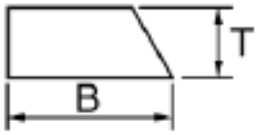
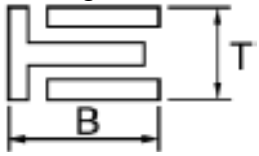




| Head Diameter | Face Width | Seat Width | Margin Thickness |
|---|---|---|---|

| Item | | Metric | Standard |
|---|---|---|---|
| "A" head diameter | | | |
| | IN | 39.90 - 40.1mm | (1.5709 - 1.5787 in) |
| | EX | 33.90 - 33.98 mm | (1.3346 - 1.3378 in) |
| "B" face width | | | |
| | IN | 2. 5 mm | (0.0984 in) |
| | EX | 4.2 mm | (0.1654 in) |
| "C" seat width | | | |
| | IN | 1.1 - 1.3 mm | (0.0433 - 0.0512 in) |
| | EX | 1.1 - 1.3 mm | (0.0433 - 0.0512 in) |
| "D" margin thickness | | | |
| | IN | 1.2 - 1.1 mm | (0.0472 - 0.0433 in) |
| | EX | 1.0 - 1.1 mm | (0.0394 - 0.0433 in) |
| Stem outside diameter | | | |
| | IN | 6.97 - 6.98mm | (0.2744 - 0.2748 in) |
| | EX | 6.96 - 6.97 mm | (0.2740 - 0.2744 in) |
| Guide inside diameter | | | |
| | IN | 7.000 - 7.015 mm | (0.2756- 0.2762 in) |
| | EX | 7.000 - 7.015 mm | (0.2756- 0.2762 in) |

| Item | | Metric | Standard | Service Wear Limit | |
|---|---|---|---|---|---|
| Stem-to-guide clearance | | | | | |
| | IN | 0.010 - 0.037 mm | (0.0004 - 0.0015 in) | 0.08 mm | (0.0031 in) |
| | EX | 0.025 - 0.052 mm | (0.0010 - 0.0020 in) | 0.10 mm | (0.0039 in) |
| Stem runout limit | | → | | 0.01 mm | (0.0004 in) |
|  | | | | | |
| Valve seat width | | | | | |
| | IN | 1.1 - 1.3 mm | (0.0433 - 0.0512 in) | | |
| | EX | 1.1 - 1.3 mm | (0.0433 - 0.0512 in) | | |

| Item | Metric Standard | Service Wear Limit |
|---|---|---|
| **Valve spring** | | |
| Inner spring | | |
| Free length | | |
| IN | 39.5 mm (1.56 in) | |
| EX | 43.0 mm (1.69 in) | |
| Set length (valve closed) | | |
| IN | 32.5 mm (1.28 in) | |
| EX | 35.0 mm (1.38 in) | |
| Compressed pressure (installed) | | |
| IN | (11.73 - 14.79 kg, 32.61 lb) | |
| EX | (30.09 - 33.15 kg, 66.35 - 73.10 lb) | |
| Tilt limit * | | |
| IN | | 2.5°/1.4mm(2.5°/.055in) |
| EX | | 2.5°/1.6mm(2.5°/.063in) |
|   | | |
| Direction of winding (top view) | | |
| IN | Clockwise | |
| EX | Counter Clockwise | |
| **Piston** | | |
| Piston to cylinder clearance | 0.05 - 0.07mm (0.0020 - 0.0028 in) | 0.15 mm (0.0059 in) |
| Piston size “D” | 84.45 - 84.47mm(3.3248 - 3.3256 in) | |
|   | | |
| Measuring point “H” | 2 mm (0.08 in) | |
| Piston off-set | 0.5 mm (0.0394 in) | |
| Off-set direction | Intake side | |
| Piston pin bore inside diameter | 20.00 - 20.01 mm (0.7874 -0.7878in) | |
| Piston pin outside diameter | 19.99 - 20.00 mm(0.7870 - 0.7874 in) | |

| Item | Metric Standard | Service Wear Limit |
|---|---|---|
| **Piston rings**<br>Top ring<br>  <br><br>Type<br>Dimensions (B×□T)<br>End gap (installed)<br>Side clearance (installed)<br><br>2nd ring<br>  <br><br>Type<br>Dimensions (B ×T)<br>End gap (installed)<br>Side clearance<br><br>Oil ring<br>  <br><br>Dimensions (B×T)<br>End gap (installed)<br>Side clearance | <br><br><br>

# Specifications

| Item | Metric Standard | Service Wear Limit |
|---|---|---|
| **Shifter** | | |
| Shifter type | Shift drum and flexible shaft | |
| **Air filter oil grade** | Engine oil | |
| **Carburetor (If Equipped)** | | |
| Mark | KINZO | |
| Type | PD36J-C | |
| diffusers | Ø 33mm (1.30in) | |
| Level in float chamber | 29.5mm (1.16 in) | |
| Mass of float | 10g (0.35oz) | |
| Float needle | Ø 2.5mm (0.10in) | |
| **Oil pump** | | |
| Oil filter type | Chartaceous | |
| Oil pump type | Trochoid | |
| Tip clearance | 0.15 mm (0.0059 in) | |
| Side clearance | 0.03 - 0.10 mm (0.0012 - 0.0039 in) | |
| Body clearance | 0.09 - 0.17 mm (0.0035 - 0.0067 in) | |
| Bypass valve setting pressure | 441.0 - 637.0 Kpa (62.7 ~ 90.6 psi) | |
| Oil pressure (hot) | 65 Kpa (9.2 psi)at 1,500 r/min | |
| Pressure check location | Cylinder head | |
| **Water pump** | | |
| Type | Single-suction centrifugal pump | |
| Reduction ratio | 32/31 (1.032) | |
| **Shaft drive** | | |
| Middle gear backlash | 0.1 - 0.3 mm (0.004 - 0.012 in) | |
| Final gear backlash | 0.1 - 0.3 mm (0.004 - 0.012 in) | |
| Differential gear backlash | 0.05 - 0.25 mm (0.002 - 0.010 in) | |
| **Cooling system** | | |
| Radiator core | | |
| Width | 356 mm (14.02 in) | |
| Height | 226 mm (8.90 in) | |
| Thickness | 75.6 mm (2.98 in) | |
| Radiator cap opening pressure | 107.9 - 137.3 Kpa (15.35 -19.53 psi) | |
| Radiator capacity | 0.6 L (0.5 Imp qt, 0.63 US qt) | |
| Coolant reservoir Capacity | 0.63 L (0.56 Imp qt, 0.67 US qt) | |
| From low to full level | 0.20 L (0.18 Imp qt, 0.21 US qt) | |

# Specifications

| Item | Metric | Standard | Service Wear Limit |
|---|---|---|---|
| **Steering system** | | | |
| Type | Rack and pinion | | |
| **Front suspension** | | | |
| Shock absorber travel | 46 mm | (1.811 in) | |
| Spring free length | 311mm | (12.24 in) | |
| Spring fitting length | 265 mm | (9.65in) | |
| Spring rate | 19.4 N/mm(1.94 kg/mm, | 108.6 lb/in) | |
| Stroke | 0 - 108 mm | (0 - 4.25 in) | |
| **Rear suspension** | | | |
| Shock absorber travel | 74 mm | (2.91 in) | |
| Spring free length | 291mm | (11.46 in) | |
| Spring fitting length | 258.3 mm | (10.17 in) | |
| Spring rate | 44.1 N/mm (4.41 kg/mm,246.95lb/in) | | |
| | 117.7N/mm(11.77kg/mm,659.08 lb/in) | | |
| Stroke | 0 ~ 60 mm | (0 ~ 2.36 in) | |
| | 60 ~ 81 mm | (2.36 ~ 3.19in) | |
| **Front wheel** | | | |
| Type | Aluminum Alloy wheel | | |
| Rim size | 12×6.0 AT | | |
| Rim material | ST12 / ZL101A | | |
| Rim run out limit | | | |
| radial | | | 1.0mm (0.04in) |
| lateral | | | 1.0mm (0.04in) |
| **Rear wheel** | | | |
| Type | Aluminum Alloy wheel | | |
| Rim size | 12×8. 0AT | | |
| Rim material | ST12/ZL101A | | |
| Rim run out limit | | | |
| radial | | | 2.0mm (0.08 in) |
| lateral | | | 2.0mm (0.08 in) |
| **Brake lever and brake pedal** | | | |
| Accelerator pedal free play | 2 - 3mm | (0.079 - 0.118 in) | |
| Brake pedal free play | 2 - 3mm | (0.079 - 0.118 in) | |
| Parking brake cable free play | 2 - 3 mm | (0.079 - 0.118 in) | |

# Specifications

| Item | Metric | Standard | Service Wear Limit |
|---|---|---|---|
| **Front disc brake** | | | |
| Type | Dual | | |
| Disc outside diameter | 200mm | (7.87in) | |
| thickness | 3.5 mm | (0.14 in) | |
| Pad thickness inner | 9.0 mm | (0.35 in) | |
| Pad thickness outer | 9.0 mm | (0.35 in) | |
| Master cylinder inside diameter | 19.0mm | (0.75in) | |
| Caliper cylinder inside diameter | 25.0mm | (0.98in) | |
| Brake fluid type | DOT 4 | | |
| **Rear disc brake** | | | |
| Type | Dual | | |
| Disc outside diameter × | 170mm | (6.69 in) | |
| thickness | 5 mm | (0.20in) | |
| Pad thickness inner | 9.0 mm | (0.35 in) | |
| Pad thickness outer | 9.0 mm | (0.35 in) | |
| Master cylinder inside diameter | 19.0mm | (0.75in) | |
| Caliper cylinder inside diameter | 32.0mm | (1.26in) | |
| Brake fluid type | DOT 4 | | |

## Electrical Specifications

| Item | Metric Standard | Service Wear Limit |
|---|---|---|
| **Voltage** | 12 V | |
| **C.D.I. (ECU)**<br>Operating voltage range<br>Overvoltage protection<br>Stand by current<br>Ignition Capacitor | <br>8~16 V<br>26±2 V<br>≤50mA<br>2.2 μF | |
| **Ignition coil**<br>Minimum spark gap<br>Primary winding resistance<br>Secondary winding resistance | <br>6 mm (0.24in)<br>0.18 ~ 0.28 Ω at 20 °C (68 °F)<br>6.32 ~ 9.48 k Ω at 20 °C (68 °F) | |
| **Spark plug cap**<br>Resistance | <br>4.5~5.5 k Ω | |
| **Rectifier/regulator**<br>Regulation voltage<br>Battery protection voltage | <br>14.5±0.5 V<br>≤15 V | |
| **Battery**<br>Specific gravity | <br>Gel battery | |
| **Circuit breaker**<br>Type<br>Main fuse<br>Lighting system fuse<br>Ignition fuse<br>Auxiliary DC jack fuse<br>Four-wheel drive fuse<br>Signaling system fuse<br>Backup fuse(odometer)<br>Reserve<br>Reserve<br>Reserve<br>Reserve | <br>Fuse<br>30 A×1<br>15 A×1<br>10 A×1<br>10 A×1<br>5 A×1<br>10 A×1<br>10 A×1<br>30 A×1<br>15 A×1<br>10 A×1<br>5 A×1 | |
| **Radiator fan**<br>Running rpm | <br>2,950 r/min | |

# Specifications

| Item | Metric | Standard | Service Wear Limit |
|---|---|---|---|
| **Electric starter system** | | | |
| Type | Constant mesh type | | |
| Starter motor | | | |
| Output | 0.7 kW | | |
| Brush overall length | 12.5 mm (0.49 in) | | |
| Spring force | 7.65 ~ 10.01 N | (27.5 ~ 36.0 oz) | 5 mm (0.20 in) |
| Commutator diameter | 28 mm (1.10 in) | | ---- |
| Mica undercut | 0.7 mm (0.03 in) | | 27 mm (1.06 in) |
| Starter relay | | | |
| Amperage rating | 180 A | | |
| Coil winding resistance | 4.18 ~ 4.62 at 20 °C (68 °F) | | |

## Torque Specifications

## Engine

| Part to be tightened | Part name | Thread size | Q'ty | Tightening torque | | | Remarks |
|---|---|---|---|---|---|---|---|
| | | | | Nm | m · kg | ft · lb | |
| Cylinder head | Bolt | M6 | 1 | 10 | 1.0 | 7.2 | |
| | Bolt | M9 | 6 | 38 | 3.8 | 27 | |
| Spark plug | — | M12 | 1 | 18 | 1.8 | 13 | |
| Cylinder head (exhaust pipe) | Stud bolt | M8 | 4 | 15 | 1.5 | 11 | |
| Cylinder head cover | Bolt | M6 | 17 | 10 | 1.0 | 7.2 | |
| Tappet cover (exhaust) | — | M32 | 2 | 12 | 1.2 | 8.7 | |
| Tappet cover (intake) | Bolt | M6 | 4 | 10 | 1.0 | 7.2 | |
| Oil gallery bolt | — | M6 | 1 | 7 | 0.7 | 5.1 | |
| Camshaft end cap | Bolt | M6 | 1 | 10 | 1.0 | 7.2 | |
| Cylinder | Bolt | M6 | 2 | 10 | 1.0 | 7.2 | |
| | Bolt | M10 | 4 | 42 | 4.2 | 30 | |
| Balancer driven gear | Nut | M18 | 1 | 110 | 11.0 | 80 | |
| Timing chain tensioner | Bolt | M6 | 2 | 10 | 1.0 | 7.2 | |
| Timing chain tensioner cap | Bolt | M6 | 1 | 7 | 0.7 | 5.1 | |
| Timing chain guide (intake side) | Bolt | M6 | 2 | 8 | 0.8 | 5.8 | |
| Camshaft sprocket | Bolt | M7 | 2 | 20 | 2.0 | 14 | |
| Rocker arm shaft stopper | Bolt | M6 | 2 | 10 | 1.0 | 7.2 | |
| Valve adjusting locknut | — | M6 | 5 | 14 | 1.4 | 10 | |
| Engine oil drain bolt | — | M14 | 1 | 30 | 3.0 | 22 | |
| Oil filter cartridge union bolt | — | M20 | 1 | 63 | 6.3 | 4.6 | |
| Oil filter cartridge | — | M20 | 1 | 17 | 1.7 | 12 | |
| Oil pipe assembly | Bolt | M6 | 4 | 7 | 0.7 | 5.1 | |
| Oil delivery pipe 1 | Union Bolt | M8 | 2 | 18 | 1.8 | 13 | |
| Oil delivery pipe 2 | Union Bolt | M14 | 1 | 35 | 3.5 | 25 | |
| Oil delivery pipe 3 | Union Bolt | M10 | 1 | 20 | 2.0 | 14 | |
| Oil delivery pipe 2 and oil delivery pipe 3 | Union bolt | M14 | 1 | 35 | 3.5 | 25 | |
| Relief valve assembly plate | Bolt | M6 | 2 | 10 | 1.0 | 7.2 | |
| Oil strainer | Bolt | M6 | 1 | 10 | 1.0 | 7.2 | |
| Oil pump assembly | Bolt | M6 | 3 | 10 | 1.0 | 7.2 | |
| Oil cooler inlet pipe 1/oil cooler outlet pipe 1 | Bolt | M6 | 2 | 7 | 0.7 | 5.1 | |
| Oil cooler inlet pipe 1/oil cooler outlet pipe 1 clamp | Bolt | M6 | 1 | 7 | 0.7 | 5.1 | |
| Oil cooler inlet pipe 2/oil cooler outlet pipe 2 clamp | Bolt | M6 | 2 | 7 | 0.7 | 5.1 | |
| Intake manifold | Bolt | M6 | 4 | 10 | 1.0 | 7.2 | |
| Carburetor joint (intake manifold) | — | M5 | 1 | 3 | 0.3 | 2.1 | |
| Intake manifold screw clamp | — | M5 | 1 | 3 | 0.3 | 2.1 | |

| Part to be tightened | Part name | Thread size | Q'ty | Tightening torque | | | Remarks |
|---|---|---|---|---|---|---|---|
| | | | | Nm | m · kg | ft · lb | |
| | Bolt | M8 | 3 | 26 | 2.6 | 19 | |
| Crankcase | Bolt | M6 | 14 | 10 | 1.0 | 7.2 | |
| | Bolt | M6 | 1 | 10 | 1.0 | 7.2 | |
| Bearing housing (clutch housing assembly) | Bolt | M6 | 1 | 10 | 1.0 | 7.2 | |
| Air duct assembly 1 bracket | Bolt | M6 | 2 | 14 | 1.4 | 10 | |
| Oil seal (engine cooling fan pulley) Retainer | Bolt | M5 | 2 | 7 | 0.7 | 5.1 | |
| Drive belt case | Bolt | M6 | 9 | 10 | 1.0 | 7.2 | |
| Drive belt cover | Bolt | M6 | 14 | 10 | 1.0 | 7.2 | |
| Engine cooling fan | Bolt | M6 | 2 | 7 | 0.7 | 5.1 | |
| Air shroud 1 and air shroud 2 | Bolt | M6 | 4 | 10 | 1.0 | 7.2 | |
| Air shroud 2 and A.C. magneto cover | Bolt | M6 | 4 | 10 | 1.0 | 7.2 | |
| Engine cooling fan pulley | Bolt | M10 | 1 | 55 | 5.5 | 40 | |
| Engine cooling fan air duct assembly | Bolt | M6 | 1 | 7 | 0.7 | 5.1 | |
| Stator assembly | Screw | M6 | 3 | 7 | 0.7 | 5.1 | |
| Pickup coil | Bolt | M5 | 2 | 7 | 0.7 | 5.1 | |
| Stator lead holder | Bolt | M6 | 2 | 10 | 1.0 | 7.2 | |
| A.C. magneto cover | Bolt | M6 | 12 | 10 | 1.0 | 7.2 | |
| Starter clutch | Bolt | M8 | 3 | 30 | 3.0 | 22 | |
| Clutch carrier assembly | Nut | M22 | 1 | 160 | 16.0 | 115 | Stake |
| Clutch housing assembly | Bolt | M6 | 9 | 10 | 1.0 | 7.2 | |
| Bearing retainer (middle drive shaft) | Screw | M8 | 4 | 29 | 2.9 | 21 | |
| Middle drive pinion gear | Nut | M22 | 1 | 145 | 14.5 | 105 | Stake |
| Middle drive shaft bearing housing | Bolt | M8 | 4 | 32 | 3.2 | 23 | |
| Middle driven pinion gear bearing Retainer | Nut | M60 | 1 | 110 | 11.0 | 80 | Left-hand threads |
| Universal joint yoke and middle driven pinion gear | Nut | M16 | 1 | 150 | 15.0 | 110 | |
| Middle driven pinion gear bearing Housing | Bolt | M8 | 4 | 25 | 2.5 | 18 | |
| Drive shaft coupling and middle driven shaft | Nut | M14 | 1 | 97 | 9.7 | 70 | |
| Middle driven shaft bearing retainer | Nut | M55 | 1 | 80 | 8.0 | 58 | Left-hand threads |
| Primary sheave assembly | Nut | M16 | 1 | 120 | 12.0 | 85 | |
| Primary pulley sheave cap | Screw | M4 | 8 | 3 | 0.3 | 2.2 | |
| Secondary sheave assembly | Nut | M16 | 1 | 100 | 10.0 | 72 | |
| Secondary sheave spring retainer | Nut | M36 | 1 | 90 | 9.0 | 65 | |
| Shift lever cover | Bolt | M6 | 4 | 10 | 1.0 | 7.2 | |
| Shift lever 2 assembly | Bolt | M6 | 1 | 14 | 1.4 | 10 | |
| Shift drum stopper | Bolt | M14 | 1 | 18 | 1.8 | 13 | |
| Shift arm | Bolt | M6 | 1 | 14 | 1.4 | 10 | |

| Part to be tightened | Part name | Thread size | Q'ty | Tightening torque | | | Remarks |
|---|---|---|---|---|---|---|---|
| | | | | Nm | m.kg | ft · lb | |
| Shift rod locknut (select lever unit) | — | M8 | 1 | 15 | 1.5 | 11 | Left-hand threads |
| Shift rod locknut (shift arm side) | — | M8 | 1 | 15 | 1.5 | 11 | |
| Select lever unit | Bolt | M8 | 3 | 15 | 1.5 | 11 | |
| Plug (right crankcase) | — | M14 | 1 | 18 | 1.8 | 13 | |
| Water pump assembly | Bolt | M6 | 2 | 10 | 1.0 | 7.2 | |
| Water pump housing cover | Bolt | M6 | 2 | 12 | 1.2 | 8.7 | |
| Coolant drain bolt | — | M6 | 1 | 10 | 1.0 | 7.2 | |
| Coolant inlet joint | Bolt | M6 | 2 | 10 | 1.0 | 7.2 | |
| Coolant outlet joint | Bolt | M6 | 2 | 10 | 1.0 | 7.2 | |
| Air bleed bolt (coolant outlet joint) | — | M6 | 1 | 9 | 0.9 | 6.5 | |
| Coolant reservoir | Bolt | M6 | 2 | 7 | 0.7 | 5.1 | |
| Radiator bracket and frame | Bolt | M6 | 4 | 7 | 0.7 | 5.1 | |
| Fuel pump | Bolt | M6 | 2 | 7 | 0.7 | 5.1 | |
| Fuel tank | Bolt | M8 | 2 | 30 | 3.0 | 22 | |
| Muffler stay | Bolt | M6 | 2 | 11 | 1.1 | 8.0 | |
| Muffler and exhaust pipe | Bolt | M8 | 1 | 20 | 2.0 | 14 | |
| Muffler bracket and muffler | Bolt | M8 | 1 | 20 | 2.0 | 14 | |
| Muffler bracket and frame | Bolt | M8 | 2 | 20 | 2.0 | 14 | |
| Muffler damper and muffler | Bolt | M6 | 1 | 10 | 1.0 | 7.2 | |
| Muffler damper and frame | Bolt | M6 | 1 | 10 | 1.0 | 7.2 | |
| Exhaust pipe | Nut | M8 | 4 | 14 | 1.4 | 10 | |
| Air duct assembly 1 | Bolt | M6 | 2 | 7 | 0.7 | 5.1 | |
| Air duct assembly 2 and left protector | Bolt | M6 | 1 | 7 | 0.7 | 5.1 | |
| Air duct assembly 2 and frame | Bolt | M6 | 1 | 7 | 0.7 | 5.1 | |
| Gear position switch | Bolt | M5 | 2 | 7 | 0.7 | 5.1 | |
| Thermo switch 1 (cylinder head) | — | 1/8 | 1 | 8 | 0.8 | 5.8 | |
| Thermo switch 3 (radiator) | — | M18 | 1 | 28 | 2.8 | 20 | |
| Reverse switch | — | M10 | 1 | 20 | 2.0 | 14 | |
| Engine ground lead | Bolt | M6 | 1 | 10 | 1.0 | 7.2 | |
| Starter motor and engine | Bolt | M6 | 2 | 10 | 1.0 | 7.2 | |

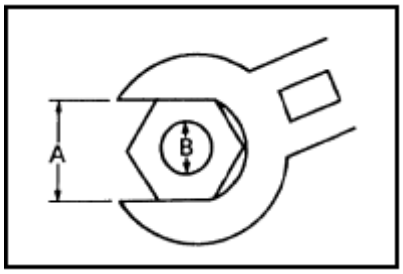
## Chassis Torques

| Part to be tightened | Thread size | Tightening torque | | | Remarks |
|---|---|---|---|---|---|
| | | Nm | m · kg | ft · lb | |
| Rubber connecting bracket 1(or 2) and frame | M10 | 52 | 5.2 | 37 | |
| Engine and Rubber connecting bracket 2 (front) | M10 | 52 | 5.2 | 37 | |
| | M6 | 10 | 1.0 | 7.2 | |
| Engine and Rubber connecting bracket 1 (rear) | M8 | 33 | 3.3 | 24 | |
| | M6 | 10 | 1.0 | 7.2 | |
| Rear upper arm and frame | M10 | 45 | 4.5 | 32 | |
| Rear lower arm and frame | M10 | 45 | 4.5 | 32 | |
| Rear knuckle and rear upper arm | M10 | 45 | 4.5 | 32 | |
| Rear knuckle and rear lower arm | M10 | 45 | 4.5 | 32 | |
| Rear shock absorber and frame | M10 | 45 | 4.5 | 32 | |
| Rear shock absorber and rear lower arm | M10 | 45 | 4.5 | 32 | |
| Rear Balancing pole and frame | M8 | 32 | 3.2 | 23 | |
| ball head of Rear Balancing pole and Rear Balancing pole | M10 | 56 | 5.6 | 40 | |
| ball head of Rear Balancing pole and rear lower arm | M10 | 56 | 5.6 | 40 | |
| Differential gear case and frame | M10 | 55 | 5.5 | 40 | |
| Differential gear case filler plug | M14 | 23 | 2.3 | 17 | |
| Differential gear case drain plug | M10 | 10 | 1.0 | 7.2 | |
| Universal joint yoke and drive pinion gear | M14 | 62 | 6.2 | 45 | |
| Differential motor and differential gear case cover | M8 | 13 | 1.3 | 9.4 | |
| Differential gear case cover and differential gear case | M8 | 25 | 2.5 | 18 | |
| Rear driving axle gear case and frame | M10 | 70 | 7.0 | 51 | |
| Rear driving axle gear case filler plug | M20 | 23 | 2.3 | 17 | |
| Rear driving axle gear case drain plug | M10 | 20 | 2.0 | 14 | |
| Ring gear bearing housing and final drive gear case | M8 | 23 | 2.3 | 17 | |
| | M10 | 40 | 4.0 | 29 | |
| Ring gear stopper nut | M8 | 16 | 1.6 | 11 | |
| Bearing retainer and final gear pinion gear bearing housing | M65 | 170 | 17.0 | 125 | Left-hand threads |
| Coupling gear and final drive pinion gear | M12 | 80 | 8.0 | 58 | |
| Front upper arm and frame | M10 | 45 | 4.5 | 32 | |
| Front lower arm and frame | M10 | 45 | 4.5 | 32 | |
| Front shock absorber and frame | M10 | 45 | 4.5 | 32 | |
| Front shock absorber and front upper arm | M10 | 45 | 4.5 | 32 | |
| Steering shaft assembly and steering Cross gimbal | M8 | 22 | 2.2 | 16 | |
| Steering assembly and steering Cross gimbal | M8 | 22 | 2.2 | 16 | |
| Steering assembly and frame | M10 | 48 | 4.8 | 35 | |
| Steering shaft assembly and frame | M8 | 21 | 2.1 | 15 | |
| Steering wheel and steering shaft assembly | M12 | 35 | 3.5 | 25 | |
| Steering knuckle and front upper arm | M12 | 30 | 3.0 | 22 | |
| Steering knuckle and front lower arm | M12 | 30 | 3.0 | 22 | |
| Tie-rod locknut | M12 | 40 | 4.0 | 29 | |
| Steering knuckle and tie-rod | M12 | 39 | 3.9 | 28 | |
| Front lower arm protector board and front lower arm | M6 | 7 | 0.7 | 5.1 | |
| Seat belt and frame | M10 | 59 | 5.9 | 43 | |

| Part to be tightened | Thread size | Tightening torque | | | Remarks |
|---|---|---|---|---|---|
| | | Nm | m · kg | ft · lb | |
| Seat belt and ceiling (enclosure) | 7/16 | 59 | 5.9 | 43 | |
| Front wheel and front wheel hub | M10 | 55 | 5.5 | 40 | |
| Front wheel hub and constant velocity joint of half shaft | M20 | 260 | 26.0 | 190 | Stake |
| Steering knuckle and brake disc guard | M6 | 7 | 0.7 | 5.1 | |
| Front brake caliper and front wheel steering knuckle | M10 | 48 | 4.8 | 35 | |
| Front brake hose union bolt | M10 | 27 | 2.7 | 19 | |
| Front brake hose holder and steering knuckle | M6 | 7 | 0.7 | 5.1 | |
| Front brake hose holder and front upper arm | M6 | 7 | 0.7 | 5.1 | |
| Front brake hose holder and frame | M6 | 7 | 0.7 | 5.1 | |
| Front brake pad holding bolt | M8 | 18 | 1.8 | 13 | |
| Front brake disc and front wheel hub | M8 | 30 | 3.0 | 22 | |
| Front brake caliper bleed screw | M6 | 6 | 0.6 | 4.3 | |
| Rear wheel and rear wheel hub | M10 | 55 | 5.5 | 40 | |
| Rear wheel hub and constant velocity joint of half shaft | M20 | 260 | 26.0 | 190 | Stake |
| Rear brake hose and frame | M6 | 7 | 0.7 | 5.1 | |
| Brake pipe and brake master cylinder | M10 | 19 | 1.9 | 13 | |
| Pedal holder assembly and frame | M8 | 16 | 1.6 | 11 | |
| Brake master cylinder and pedal holder assembly | M8 | 16 | 1.6 | 11 | |
| Secondary brake master cylinder kit stopper bolt | M6 | 9 | 0.9 | 6.5 | |
| Brake rod locknut | M8 | 17 | 1.7 | 12 | |
| Rear brake disc and brake disc Install seat | M6 | 10 | 1.0 | 7.2 | |
| Rear brake pad holding bolt | M8 | 17 | 1.7 | 12 | |
| Rear brake caliper and Install seat | M10 | 40 | 4.0 | 29 | |
| Rear brake hose union bolt | M10 | 27 | 2.7 | 19 | |
| Parking brake case and rear brake caliper | M8 | 22 | 2.2 | 16 | |
| Parking brake lever assembly and frame | M6 | 7 | 0.7 | 5.1 | |
| Rear brake caliper bleed screw | M6 | 5 | 0.5 | 3.6 | |
| Upper instrument panel and frame | M6 | 7 | 0.7 | 5.1 | |
| Support frame (enclosure) and frame | M10 | 64 | 6.4 | 46 | |
| Support frame (enclosure) and side frame (enclosure) | M10 | 64 | 6.4 | 46 | |
| Top frame (enclosure) and side frame (enclosure) | M10 | 64 | 6.4 | 46 | |
| Seat support and frame | M8 | 16 | 1.6 | 11 | |
| Footrest plate and frame | M6 | 7 | 0.7 | 5.1 | |

## General Torque Specifications

This chart specifies tightening torques for standard fasteners with a standard ISO thread pitch.
Tightening torque specifications for special components or assemblies are provided for each chapter of this manual. To avoid warpage, tighten multi-fastener assemblies in a crisscross pattern and progressive stages until the specified tightening torque is reached.
Unless otherwise specified, tightening torque specifications require clean, dry threads. Components should be at room temperature.




A: Distance between flats
B: Outside thread diameter

| A (nut) | B (bolt) | General tightening torques | | |
|---|---|---|---|---|
| | | Nm | m · kg | ft · lb |
| 10 mm | 6 mm | 6 | 0.6 | 4.3 |
| 12 mm | 8 mm | 15 | 1.5 | 11 |
| 14 mm | 10 mm | 30 | 3.0 | 22 |
| 17 mm | 12 mm | 55 | 5.5 | 40 |
| 19 mm | 14 mm | 85 | 8.5 | 61 |
| 22 mm | 16 mm | 130 | 13.0 | 94 |

## Lubrication Points and types of Lubricant

### Engine

| Lubrication points | Lubricant |
|---|---|
| Oil seal lips | Apply lithium-soap-based grease |
| Bearings | Apply engine oil |
| O-rings | Apply lithium-soap-based grease |
| Piston, piston ring | Apply engine oil |
| Piston pin | Apply engine oil |
| Buffer boss and balancer drive gear | Apply engine oil |
| Crankshaft seal and spacer | Apply engine oil |
| Valve stem | Apply molybdenum disulfide oil |
| Valve stem end | Apply molybdenum disulfide oil |
| Rocker arm shaft | Apply engine oil |
| Rocker arm | Apply molybdenum disulfide grease |
| Camshaft lobe and journal | Apply molybdenum disulfide grease |
| Oil pump assembly | Apply engine oil |
| Oil filter cartridge O-ring | Apply lithium-soap- based grease |
| Starter idle gear shaft | Apply molybdenum disulfide grease |
| Starter wheel gear | Apply engine oil |
| Clutch housing assembly shaft end | Apply lithium-soap- based grease |
| Clutch carrier assembly | Apply engine oil |
| One-way clutch bearing | Apply molybdenum disulfide grease |
| Middle driven shaft splines | Apply molybdenum disulfide oil |
| Drive axle, driven sprocket, high wheel gear, and low wheel gear | Apply molybdenum disulfide oil |
| Middle drive gear and clutch dog shift fork groove | Apply molybdenum disulfide oil |
| Driven chain/sprocket | Apply engine oil |
| Shift drum | Apply engine oil |
| Shift fork guide bar | Apply engine oil |
| Shift drum stopper ball | Apply engine oil |
| Shift lever 2 assembly | Apply lithium-soap- based grease |
| Shift lever 1 | Apply engine oil |
| Shift lever 1 and shift lever 2 assembly mating surface | Apply engine oil |

## Chassis

| Lubrication points | Lubricant |
|---|---|
| Lip of oil seal (full) | Light lithium-base grease |
| o-ring(full) | Light lithium-base grease |
| Steering shaft (upper end ,lower end) | Light lithium-base grease |
| Ball connection of steering pushing rod | Light lithium-base grease |
| Front wheel fork(ball-shaped joint) | Light lithium-base grease |
| Front wheel bearing | Grease used for bearing |
| Front & rear brake | Light lithium-base grease |
| Dust-proof ring of brake | Light lithium-base grease |
| Joint of front brake cable | Light lithium-base grease |
| Front brake lever axle and rear brake lever axle | Light lithium-base grease |
| Adjusting nut and pin of front brake cable | Light lithium-base grease |
| Adjusting nut and pin of rear brake cable | Light lithium-base grease |
| Rear brake pedal pivot and brake pedal axle hole | Light lithium-base grease |
| Throttle rotating frame shaft and end section of throttle cable | Light lithium-base grease |
| Reverse gear lever pivot | Light lithium-base grease |
| Connection bolt of rear wheel fork and frame,rear wheel fork bearing | Light lithium-base grease |
| Rubber sleeve and rear wheel fork | Seal gum |
| Rear shock absorber bushing | Light lithium-base grease |
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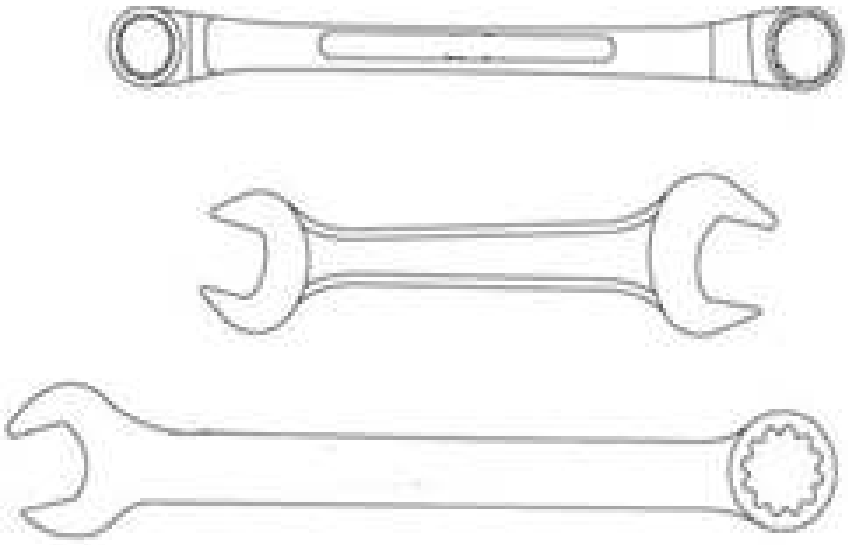



| | | | |
|---|---|---|---|
| **Maintenance schedule** | **3-3** | **Brake Pedal** | **3-16** |
| **Valve Adjustment** | **3-5** | **Brake Pads** | **3-18** |
| **Idle Adjustment** | **3-6** | **Brake Lines** | **3-19** |
| **Spark Plug, Compression test** | **3-7** | **Shift Lever Adjustment** | **3-20** |
| **Engine Oil** | **3-8** | **Final Gear oil** | **3-21** |
| **Air filter** | **3-10** | **Steering system** | **3-23** |
| **Coolant level** | **3-11** | **Tires** | **3-24** |
| **V-Belt** | **3-15** | **Shock Absorbers** | **3-25** |
| **Spark arrester** | **3-16** | **Headlight adjustment** | **3-27** |

## Maintenance and adjustment of the UTV

***Note:***

***Correct maintenance and adjustments are necessary to ensure the vehicles safety and normal driving ability. Repair personnel should become familiar with the procedures outlined in the maintenance schedule.***

### Maintenance Schedule

| ITEM | ROUTINE | Whichever comes first ⇨ | | EVERY | | | INITAL | |
|---|---|---|---|---|---|---|---|---|
| | | | month | 1 | 3 | 6 | 6 | 12 |
| | | | km | 320 | 1,200 | 2,400 | 2,400 | 4,800 |
| | | | (mi) | (200) | (750) | (1,500) | (1,500) | (3,000) |
| | | | hours | 20 | 75 | 150 | 150 | 300 |
| Exhaust system* | • Check for leakage.<br>• Tighten if necessary.<br>• Replace gasket(s) if necessary. | | | | | ○ | | ○ |
| Spark arrester | • Clean. | | | | | ○ | ○ | ○ |
| Fuel line* | • Check fuel hose for cracks or damage.<br>• Replace if necessary. | | | | | ○ | ○ | ○ |
| Air filter element | • clean.<br>• Replace if necessary. | | | Every20-40hours<br>( More often in wet of dusty areas. ) | | | | |
| Front brake* | • Check operation/ fluid leakage. ( See NOTE page 8).<br>• Correct if necessary. | | | ○ | ○ | ○ | ○ | ○ |
| Rear brake* | • Check operation.<br>• Adjust if necessary. | | | ○ | ○ | ○ | ○ | ○ |
| Wheel | • Check balance/damage/<br>• Repair if necessary. | | | ○ | | ○ | ○ | ○ |
| Front and rear suspension* | • Check operation.<br>• Correct if necessary. | | | | | ○ | | ○ |
| Wheel bearing* | •Check bearing assemblies for looseness /damage.<br>• Replace if necessary. | | | ○ | | ○ | ○ | ○ |
| Steering system* | • Check operation./Replace if damaged<br>• check toe-in./Adjust if necessary. | | | ○ | ○ | ○ | ○ | ○ |
| Select lever safety system cable | • Check operation.<br>• Adjust if necessary. | | | | | ○ | ○ | ○ |
| Drive shaft universal joint* | • Lubricate with lithium–soap–based grease. | | | | | ○ | ○ | ○ |
| Axle boots* | • Check operation.<br>• Replace if damaged. | | | ○ | ○ | ○ | ○ | ○ |
| Fittings and fasteners* | • Check all chassis fittings and fasteners.<br>• Correct if necessary. | | | ○ | ○ | ○ | ○ | ○ |
| Valves | • Check valve clearance.<br>• Adjust if necessary. | | | ○ | | ○ | ○ | ○ |

## Maintenance and Adjustment of the UTV

| ITEM | ROUTINE | Whichever comes first ⇨ | | EVERY | | | INITAL | |
|---|---|---|---|---|---|---|---|---|
| | | | month | 1 | 3 | 6 | 6 | 12 |
| | | | km | 320 | 1,200 | 2,400 | 2,400 | 4,800 |
| | | | (mi) | (200) | (750) | (1,500) | (1,500) | (3,000) |
| | | | hours | 20 | 75 | 150 | 150 | 300 |
| Spark plug | • Check condition.<br>• Adjust gap and clean.<br>• Rep; ace if necessary. | | | ○ | ○ | ○ | ○ | ○ |
| Carburetor* | • Check and adjusted idle speed/starter operation.<br>• Adjust if necessary. | | | | ○ | ○ | ○ | ○ |
| V-belt* | • Check operation.<br>• Check for cracks or damage. | | | ○ | | ○ | ○ | ○ |
| Crankcase breather system* | • Check breather hose for cracks of damage.<br>• Replace if necessary. | | | | | ○ | ○ | ○ |
| Engine oil | • Replace.<br>(Warm engine before draining.) | | | ○ | | ○ | ○ | ○ |
| Engine oil strainer* | • Clean. | | | ○ | ○ | ○ | | ○ |
| Engine oil filter cartridge | • Replace. | | | ○ | ○ | ○ | | ○ |
| Final gear oil<br>Differential gear oil | • Check oil level /oil leakage.<br>• Replace | | | ○ | | | | ○ |
| Lights and switches* | • Check operation.<br>• Adjust headlight beams. | | | ○ | ○ | ○ | ○ | ○ |

***Note:***

- **Recommended brake fluid: DOT 4**
- **Brake fluid replacement:**
- **When disassembling the master cylinder or caliper, replace the brake fluid.**
- **Normally check the brake fluid level and add fluid as required.**
- **On the inner parts of the master cylinder and caliper, replace the oil seals every two years.**
- **Replace the brake hoses every four years , or if cracked or damaged.**

**Adjusting the Valve Clearance**

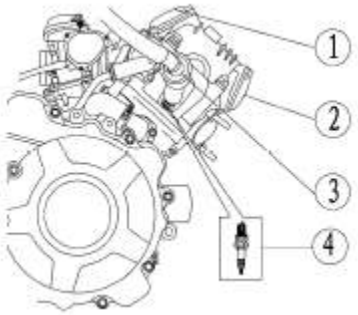
***Note:***

- **The valve clearance must be adjusted when the engine is cool to the touch.**
- **Adjust the valve clearance when the piston is at TDCC (Top Dead Center Compression).**

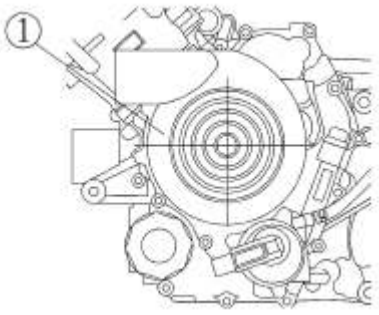
Remove：

- lift the cargo bed up
- driver's seat
- passenger's seat
- console

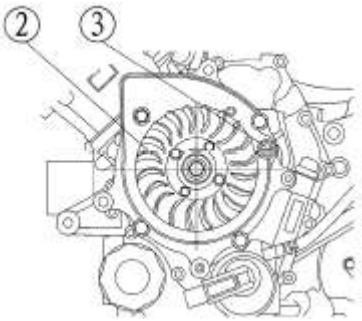
1. Remove following parts：
   - Valve cover(intake) (1)
   - Valve cover(exhaust) (2)
   - spark plug cap (3)
   - spark plug (4)



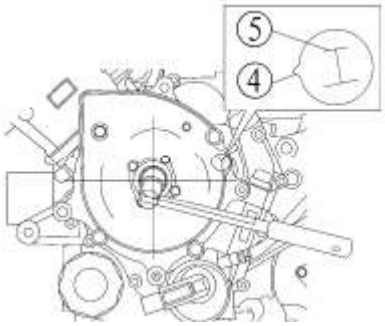

2. Remove the cooling fan：
   - Fan cover (1)




- Fan impeller (2)
- Timing inspection covers (3)



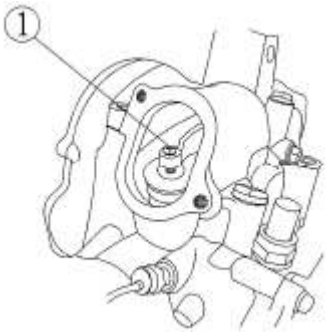

3. Rotate the crankshaft counterclockwise until the timing mark (5) aligns with the point (4) in the inspection hole.



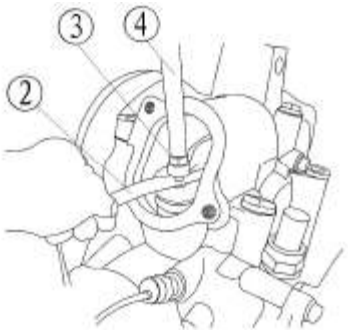

4. Check Valve Clearance

| | **Valve clearance (cold)** |
|---|---|
| **In** | **0.08 - 0.10 mm (0.0032 - 0.0039in)** |
| **Ex** | **0.08 - 0.10 mm (0.0032 - 0.0039in)** |

5. Adjust Valve Clearance
   - Loosen Locknut (1)



- Insert a Feeler gauge (2) of the proper thickness between the adjuster and valve tip.
- Turn the Adjuster (3) clockwise or counterclockwise with a tappet adjusting tool (4) to obtain the proper clearance. (Feeler gauge should have a slight drag)
- While holding the adjuster, tighten the locknut.




***Locknut Torque***
**14Nm or 10 ft lbs**

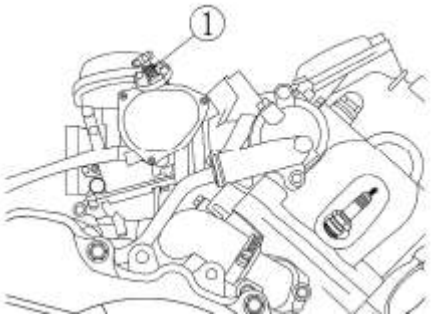
6. Install all removed parts
   - Engine fan components
   - Fan cover
   - spark plug
   - Valve cover (exhaust)
   - Valve cover (intake)
   - Lower the cargo bed.
   - Console
   - Passenger's seat
   - Driver's seat

**IDLE ADJUSTMENT**

1. Start the engine and thoroughly warm it up.
2. Lift the Cargo bed up
3. Remove the Driver's seat, Passenger's seat.
4. Watch tachometer built into the display.

**Engine idle speed**
**1,400 ±100 r/min**

5. Adjust by turning the throttle stop screw (1) to obtain the correct idle speed.




***Note:***
***Do not turn the lock screw too tight.***

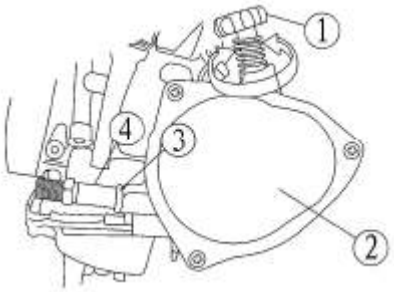
***Turning in, Idle speed becomes higher.***
***Turning out, Idle speed becomes lower.***

6. Lower the cargo bed and reinstall the Driver's seat, Passenger's seat.

***Note:***
***Throttle Cable free play should be adjusted before adjusting the idle speed.***

**Adjusting the throttle cable free play**

1. Remove the Driver's seat, passenger's seat.
2. Remove the External cover (2)
3. Loosen the locknut on the cable adjuster.
4. Turn cable adjuster (4) to achieve 0 slack in cable.
5. Tighten the locknut.




6. After adjustment, check that the throttle closes completely, if not readjust the cable free play.
7. Install External cover
8. Install Driver's seat, Passenger's seat.

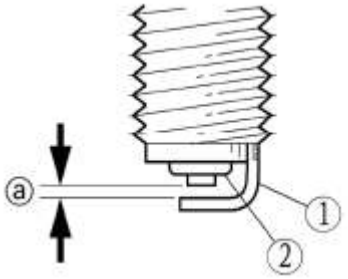
## CHECKING THE SPARK PLUG

1. Remove the seat.
2. Pull out the spark plug cap
3. With compressed air blow out the spark plug hole around the plug.
4. Remove the spark plug and check that it is the correct plug.

**Standard spark plug**
**DR8EA/NGK**

5. Inspect the electrode (1) of the spark plug. Look for burnt condition or carbon deposits. Clean and check Spark Plug Gap (a).

**Spark Plug Gap**
**0.6mm to 0.7mm**




6. Install the spark plug.

17.5 Nm **(1.8 kg ·m, 12.9 lb ·ft)**

7. Install the spark plug cap.
8. Install the seat.

## Compression Test

1. Start the engine and let it warm up for several minutes.
2. Stop the engine and remove the spark plug.
3. Assemble the compression Tester (1)and adapter (2) and thread it into the spark plug hole.
4. Install the ignition grounding tool.
5. Crank over the engine with the electric starter (be sure the battery is fully charged) with the throttle wide-open until the compression reading on the gauge stabilizes.

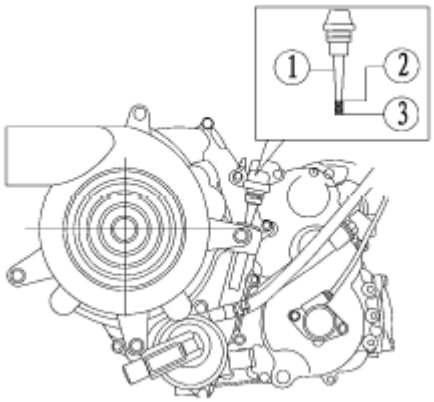
**Compression pressure**
**(at sea level)**
**Standard: 950Kpa**
**(9.7 kg/cm2, 137.8Psi)**
**Minimum: 900Kpa**
**(9.2 kg/cm2, 130.5Psi)**
**Maximum: 1000Kpa**
**(10.0kg/cm2, 145Psi**)

6. Install spark Plug

17.5 Nm **(1.8 kg ·m, 12.9 lb ·ft)**

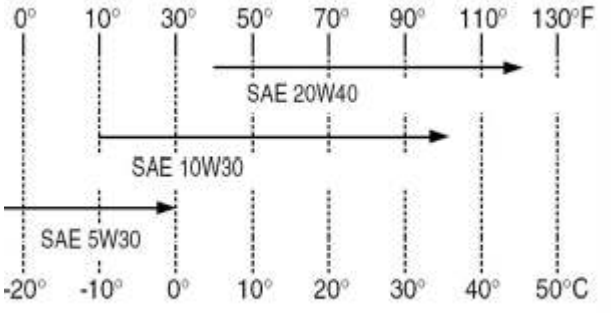
## CHECKING THE ENGINE OIL LEVEL

1. Remove the seat.
2. Check the engine oil level on the dip stick (1). The oil level should be between the Maximum (2) and minimum (3) level marks on the dip stick.




***Note:***
***Do not screw in the dip stick when checking the level, it is done with the dip stick resting on the threads.***

**Recommended oil**



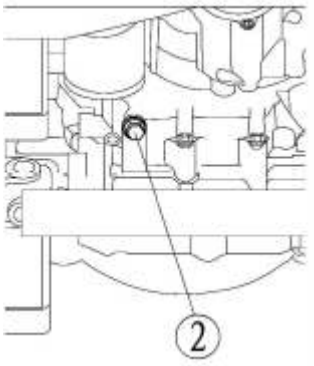

***Note:***
***Recommended oil classification:***
***API Service "SE", "SF", "SG" type or equivalent (e.g. "SF—SE—CC", "SF—SE—SD" etc.)***

3. Start the engine and allow it to warm up for several minutes.
4. Stop the engine and recheck the oil level. Add oil if necessary to achieve the proper level.

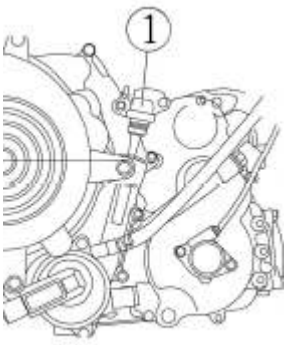
## CHANGING THE ENGINE OIL

Place the vehicle on a level surface.

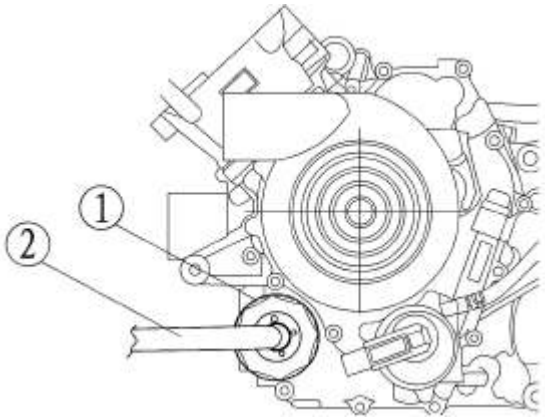
1. Start the engine and let it warm up for several minutes.
2. Stop the engine and place an oil pan under the engine oil drain bolt (2).



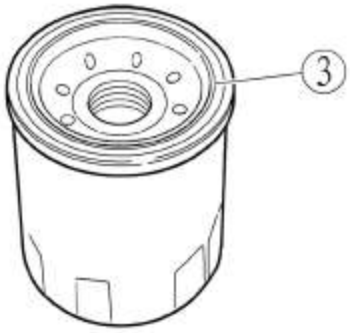

3. Remove: driver's seat, passenger's seat.
4. Remove: engine oil dipstick (1)engine oil drain bolt (2) Drain the engine oil from the crankcase.



5. If the oil filter cartridge is also to be replaced, perform the following procedure.
- Remove the oil filter cartridge (1) with an oil filter wrench (2).
- Lubricate the O-ring (3) of the new oil filter cartridge with clean engine oil.




***Note:***
**Make sure that the O-ring (3) is positioned correctly in the groove of the oil filter cartridge.**



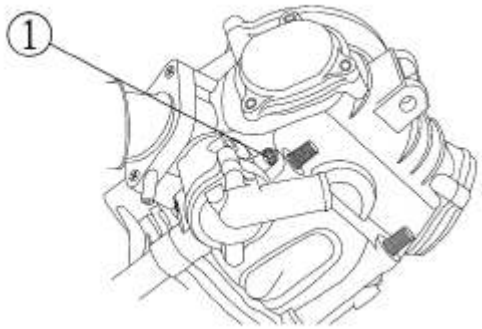

- Hand tighten the new oil filter to snug then an additional ¼ turn.

6. Install the engine oil drain bolt.
7. Fill the engine oil to the specified level on the dipstick.

**Oil quantity**
**Periodic oil change**
**The oil capacity after the engine is disassembled and reassembled.**
**2.2L or 2.32 us qts**

**The oil capacity for a complete oil change.**
**2.0L or 2.11 us qts**

8. Install the dip stick.
9. Warm up the engine for a few minutes, then stop the engine.
10. Recheck the engine oil level and add oil if necessary to achieve the proper level.
11. Check for engine oil leaks.
12. Check engine oil pressure
- Slightly loosen the oil gallery bolt (1).




- Start the engine and keep it idling until engine oil starts to seep from the oil gallery bolt. If no engine oil comes out after one minute, turn the engine off so that it will not seize.

- c. Check the engine oil passages, the oil filter cartridge and the oil pump for damage or leaks.
- 4.Start the engine after solving the problem(s) and check the engine oil pressure again.
- Tighten the oil gallery bolt to specification.

**Oil gallery bolt**
**8Nm (0.8 kg ·m, 5.9 lb ·ft)**

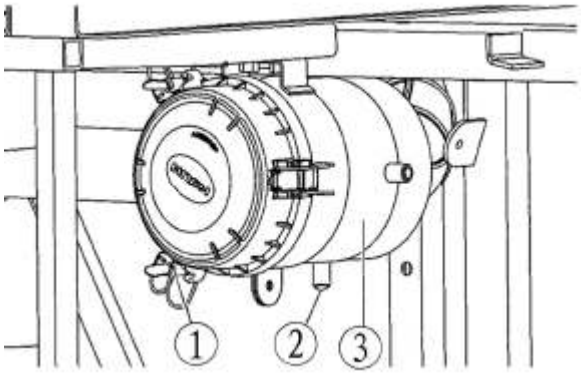
13. Install the passenger's seat, Driver's seat.

## CHASSIS

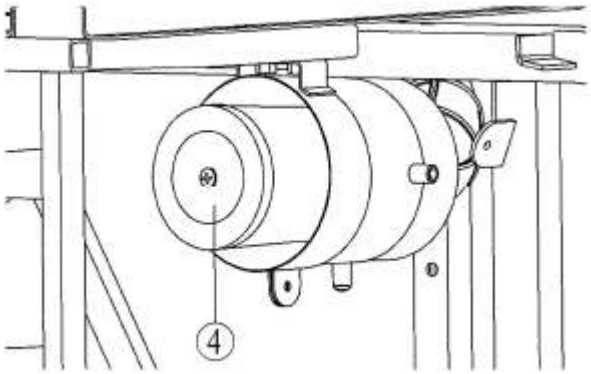
### CLEANING THE AIR FILTER

***Note:***
**There is a check hose (2) at the bottom of the air filter case. If dust and/or water collect in this hose, clean the air filter element and air filter case.**

1. Raise the cargo bed.
2. Remove the air filter cover (1).




3. Remove the air filter element. (4)



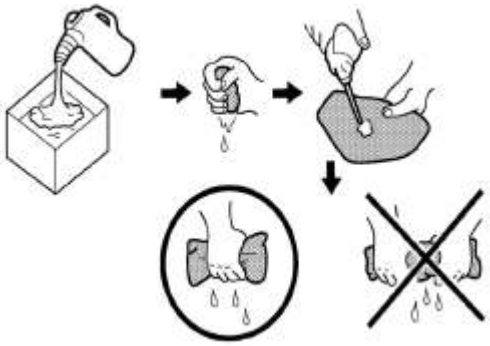

***Note:***
***Never operate the engine with the air filter element removed. This will allow unfiltered air to enter, causing rapid wear and possible engine damage. Additionally, operation without the filter element will affect carburetor tuning with subsequent poor performance and possible engine overheating.***

4. Check the air filter element
- (1) Air filter frame
- (2) Sponge material
- (3) Element retaining plate

.

5. Clean the air filter element
- Wash the element gently, but thoroughly in solvent.

***Warning:***
***Use a cleaning solvent which is designed to clean parts only. Never use gasoline or low flash point solvents as they may cause a fire or explosion.***



- Squeeze the excess solvent out of the element and let it dry.

***Note:***
***Do not twist or wring out the element. This could damage the foam material.***

- Apply engine oil onto the filter element, the squeeze out the excess oil.

***Note:***
***The element should be wet but not dripping.***

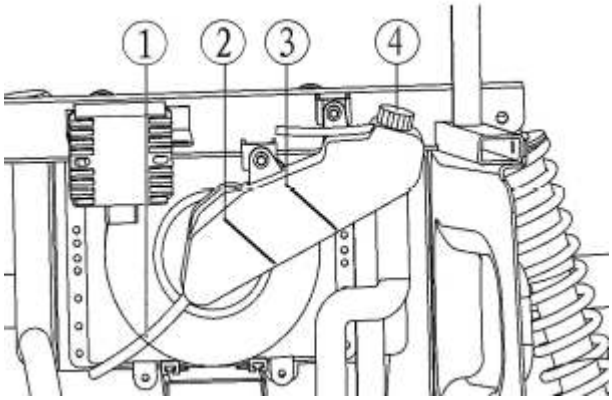
6. Install the air filter element and the air filter case cover.

***Note:***
***To prevent air leaks make sure that the sealing surface of the element matches the sealing surface of the case.***

7. Lower the cargo bed.

**CHECKING THE COOLANT LEVEL**

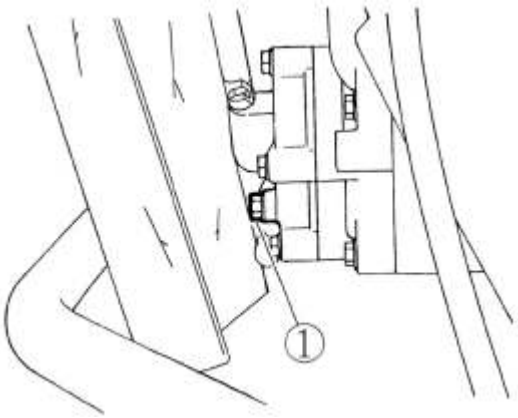
1. Place the vehicle on a level surface.
2. Lift the hood up.
3. Remove the radiator cap and check the fluid level in the radiator with the vehicle cold.
4. Fill the radiator to the top with fresh antifreeze 50/50 and install the radiator cap.
5. Check the antifreeze level in the coolant reservoir and fill to between the maximum (3) and minimum (2) lelvel indicators.




6. Start the engine and allow the vehicle to warm up.
7. Shut off the vehicle and recheck the coolant level in the reservoir.

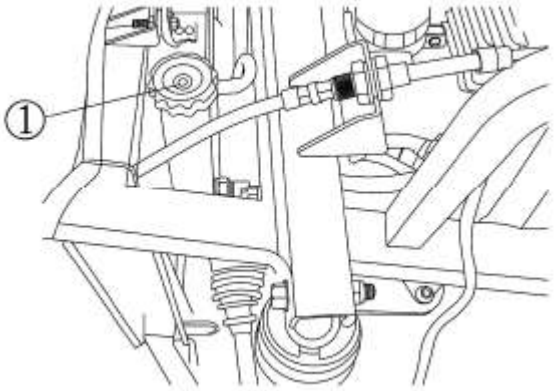
**CHANGING THE COOLANT**

1. Lift up the hood.
2. Remove the reservoir cap (4) (above).
3. Disconnect the coolant reservoir hose (1), and drain the reservoir into a suitable container.
4. Connect the reservoir hose.
5. Remove the coolant drain bolt (1) (below) along with the copper washer on the water pump.

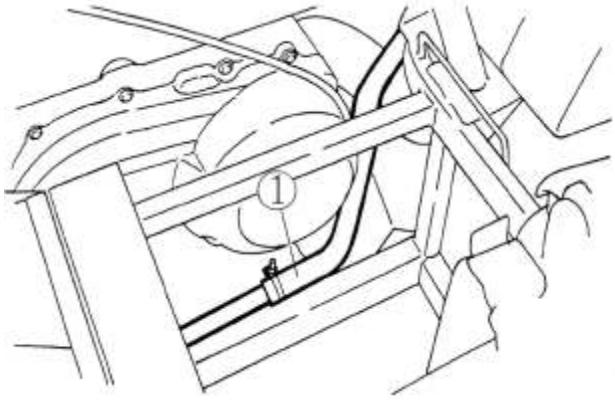


6. Remove the radiator cap (1).

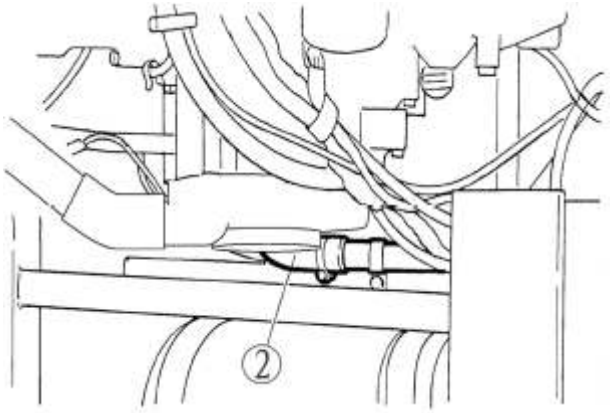
***Warning:***
***A hot radiator is under pressure. Therefore, do not remove the radiator cap when the engine is hot. Scalding hot fluid and steam may be blown out, which could cause serious injury. When the engine has cooled, open the radiator cap as follows: Place a thick rag or a towel over the radiator cap and slowly turn the radiator cap counterclockwise toward the detent to allow any residual pressure to escape. When the hissing sound has stopped, turn the radiator cap counterclockwise while pressing down on it and then remove it.***




7. Disconnect the coolant outlet hose (1).



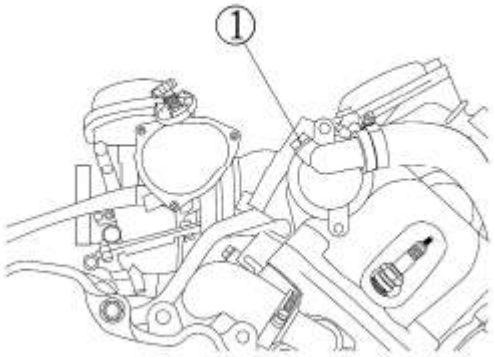

8. Disconnect the water pump inlet hose (2).




9. Drain the coolant
10. Replace the copper washer on the drain bolt with a new one and install the drain bolt.

    **10 Nm (1.0 m · kg, 7.3ft · lb)**

11. Connect the water pump inlet hose and the coolant outlet hose.
12. Remove the air bleed bolt (1).



13. Fill the radiator with the recommended antifreeze until coolant comes out of the hole for the air bleed bolt.

**Recommended antifreeze**
**High-quality ethylene glycol antifreeze containing corrosion inhibitors for aluminum engines**
**Mixing ratio**
**1 : 1 (antifreeze : water)**
**Quantity total amount**
**1.32L (1.16 lmp qt, 1.40 US qt)**
**Coolant reservoir capacity**
**0.627 L (0.55 lmp qt, 0.65 US qt)**

***Warning:***

- ***If coolant splashes in your eyes, thoroughly wash them with water and consult a doctor.***
- ***If coolant splashes on your clothes, quickly wash it away with water and then with soap and water.***
- ***If coolant is swallowed, induce vomiting and get immediate medical attention.***
- ***If coolant comes into contact with painted surfaces, immediately wash them with water.***
- ***Do not mix different types of antifreeze.***

***Note:***
***Adding water instead of coolant lowers the antifreeze content of the coolant. If water is used instead of coolant, check, and if necessary, correct the antifreeze concentration of the coolant. Use only distilled water. However, soft water may be used if distilled water is not available.***

14. Install the air bleed bolt.

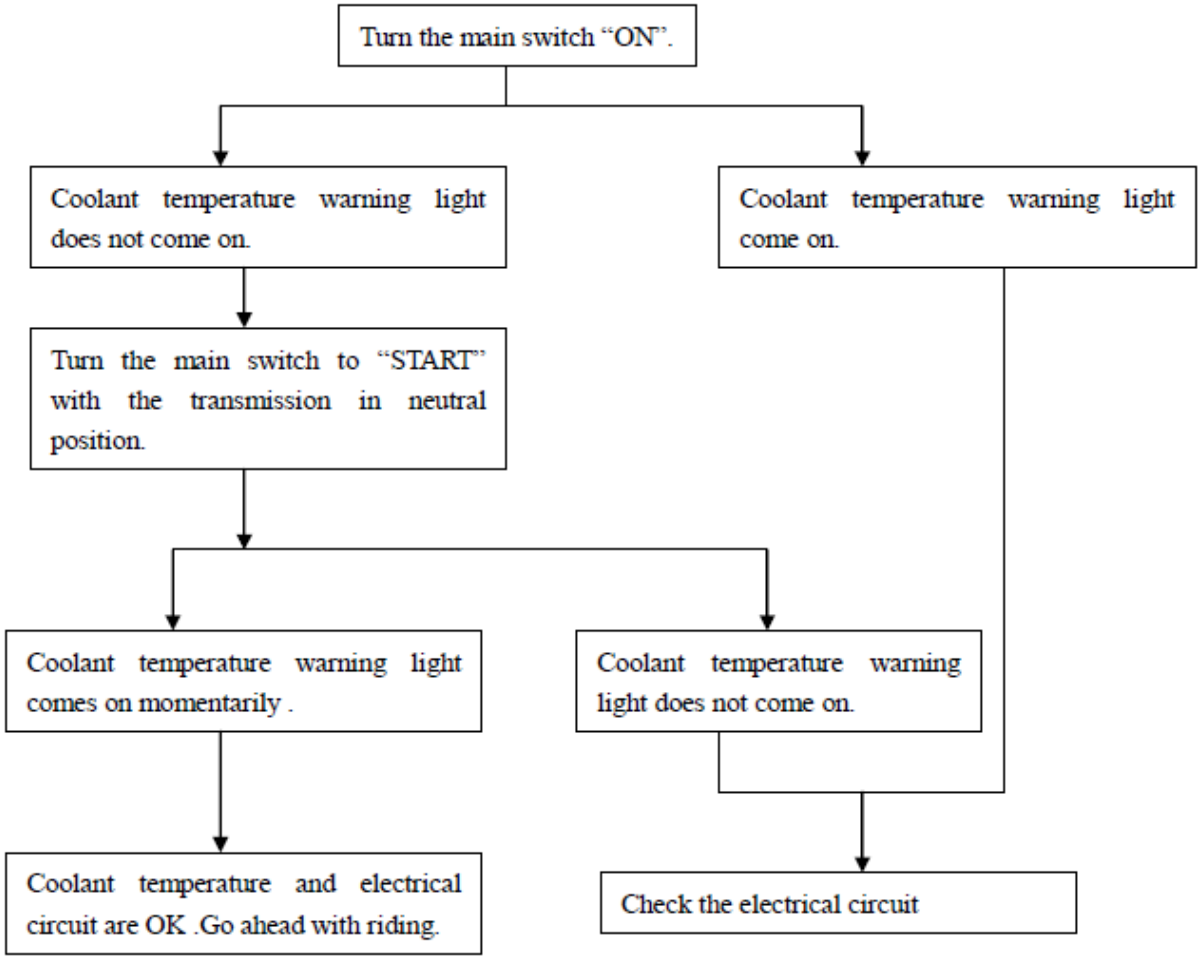
**9 Nm (0.9 m · kg, 6.5 ft · lb)**

15. Fill the coolant reservoir to between the minimum and maximum level indicators.
16. Start the engine and allow it to warm up and circulate the coolant.
17. Shut off the vehicle and allow it to cool before rechecking the coolant level.
18. Close the hood

**CHECKING THE COOLANT TEMPERATURE WARNING LIGHT**

Coolant temperature indicator light (1).

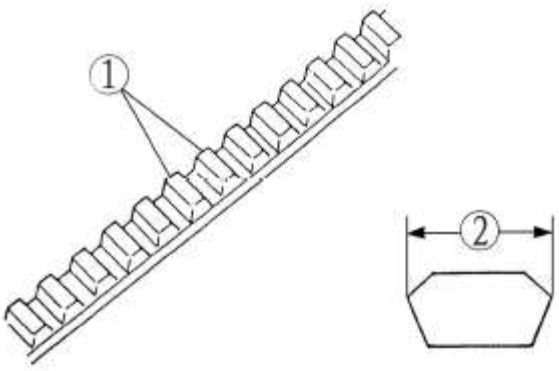
Coolant temperature warning light checking method


Turn the main switch "ON".
Coolant temperature warning light does not come on.
Coolant temperature warning light come on.
Turn the main switch to "START" with the transmission in neutral position.
Coolant temperature warning light comes on momentarily .
Coolant temperature warning light does not come on.
Coolant temperature and electrical circuit are OK .Go ahead with riding.
Check the electrical circuit

**CHECKING THE V-BELT**

1. Remove:
   - driver seat, passenger seat
   - lift the cargo bed
   - Belt cover

Inspect the V-Belt (1) for cracks, wear, chipping or fraying.

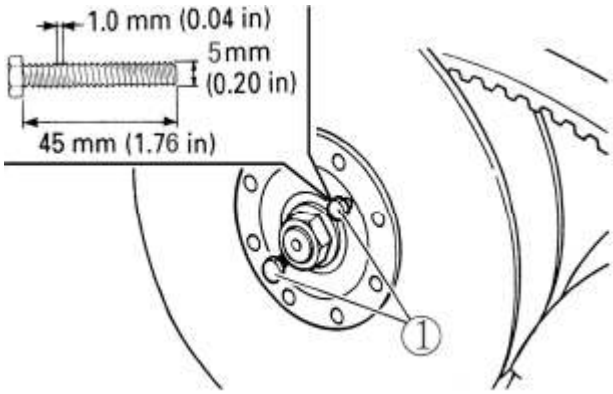



Measure the V-Belt width (2).

**V-belt width**
**33.2 mm (1.31 in)**
**<Limit:> 29.9 mm (1.18 in)**

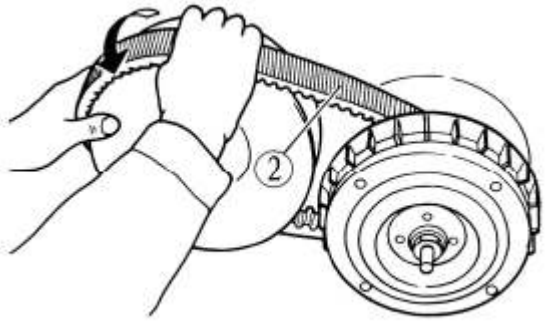
**Install and removing the V-belt**

Install the bolts (1) into the secondary fixed
sheave holes.




**Note:**
***Tightening the bolts (1) will push the secondary sliding sheave away, causing the gap between the secondary fixed and sliding sheaves to widen .***

Remove or install the V-belt (2) from the primary sheave and secondary sheave.




Remove the bolts that were installed to spread the secondary sheaves.

Install
- Drive belt cover
- Lower the cargo bed
- Passenger's, driver's seat

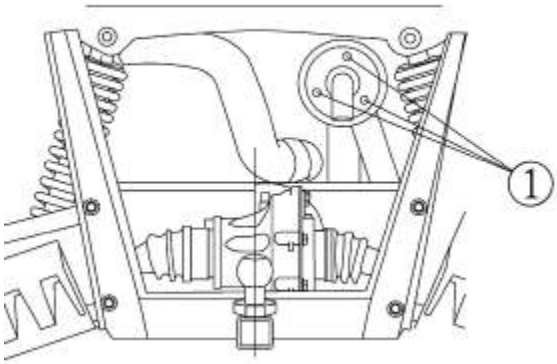
## CLEANING THE SPARK ARRESTER

1. Clean:
   Tap the tailpipe lightly with a soft-face hammer or suitable tool, then use a wire brush to remove any carbon deposits from the spark arrester portion of the tailpipe and the inner contact surfaces of the muffler.

2. Spark arrester

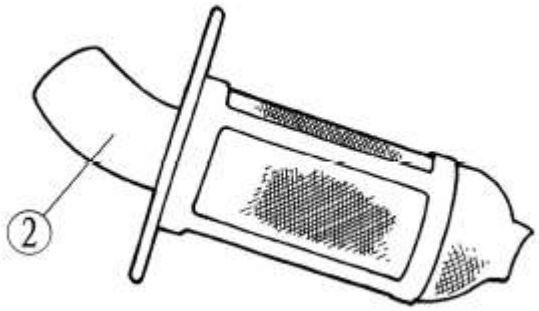
***Warning:***
***Select a well-ventilated area free of combustible materials. Always let the exhaust system cool before performing this operation. Do not start the engine when removing the tailpipe from the muffler.***

- Remove the bolts (1).




- Remove the tailpipe (2) by pulling it out of the muffler.

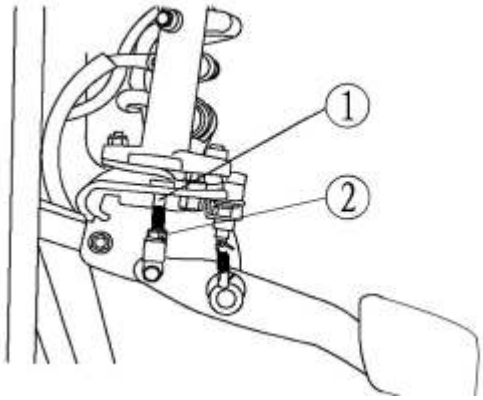
- Remove the tailpipe (2) by pulling it out of the muffler.




For installation reverse the removal process.

## ADJUSTING THE BRAKE PEDAL

- brake rod (1)
- brake locknut (2)




1. Measure the brake pedal free play.

***Note:***
**The end of the brake rod (1) should lightly contact the brake master cylinder.**

2. Adjust the free play
   - Loosen the locknut (2)
   - Turn brake rod (1) in or out until the correct free play is obtained.

**Brake pedal free play**
**0 mm (0.0 in)**

| | |
|---|---|
| Turning in | Free play is increased. |
| Turning out | Free play is decreased. |

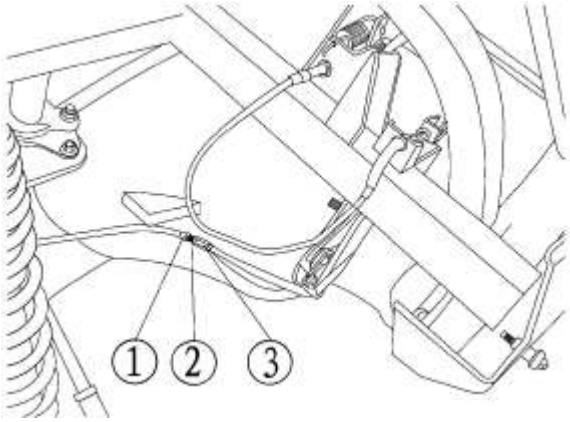
3. Tighten the locknut to specification.

**Locknut**
**17 Nm (1.7 m · kg, 12 ft · lb)**

***Note:***
***Always check that there is no drag on the front or rear wheels when completing a brake adjustment.***

## ADJUSTING THE PARKING BRAKE

- Parking Brake cable adjuster cover (1)
- Parking brake cable locknut (2)
- Parking brake cable adjuster (3)




1. Shift the drive select lever into neutral gear.

2. Lift up the hood

3. Measure the parking brake cable free play.

**Parking brake cable free play**
**2 ~ 3 mm (0.079 ~ 0.118 in)**

Adjusting the parking brake cable free play.

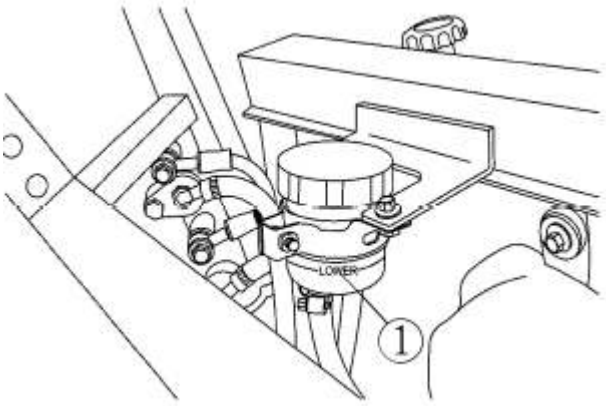
- Pull back the adjuster cover (1).
- Loosen the locknut (2).
- Turn the adjuster (3) in or out until the correct free play is obtained.

| | |
|---|---|
| Turning in | Free play is increased. |
| Turning out | Free play is decreased. |

- Tighten the locknut (2).
- Slide the adjuster cover 1 to its original position.
- Close the hood

## CHECKING THE BRAKE FLUID LEVEL

1. Place the vehicle on a level surface.



2. Lift up the hood.

3. Check that the brake fluid level is above the minimum line on the brake fluid reservoir (1).

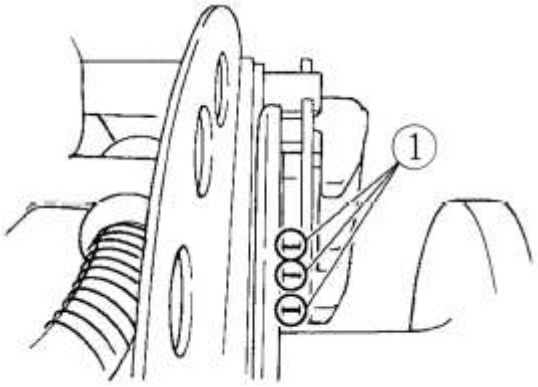
***Warning:***
***Use Only DOT 4 Brake fluid otherwise, the rubber seals may deteriorate, causing leaks and poor brake performance.***

***Note:***
***Brake fluid may erode painted surfaces or plastic parts. Always clean up spilled fluid immediately.***

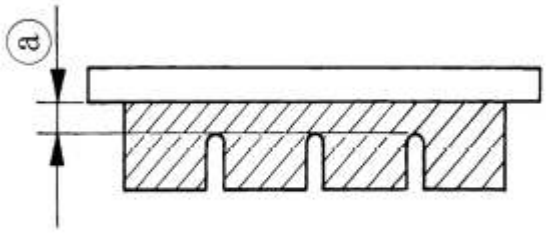
4. Close the hood.

**CHECKING THE FRONT BRAKE PADS**

1. Remove the front wheels.
2. Inspect the brake pads for wear. Look at the wear indicator grooves (1).




If needed replace the brake pads as a set.

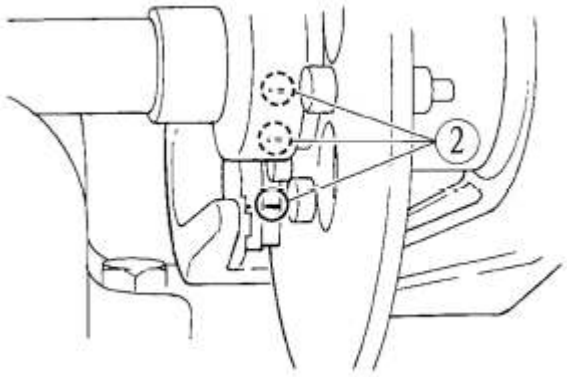



**Brake pad wear limit (a)**
**1.5 mm (0.06 in)**

3. Operate the brake pedal.
4. Install the front wheels.

**CHECKING THE REAR BRAKE PADS**

Follow the same procedure as the front brake Pads. Look at the wear indicator grooves (2).



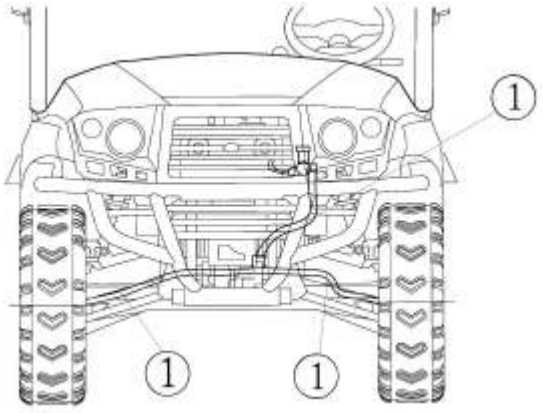

**Brake pad wear limit (a)**
**1.5 mm (0.06 in)**

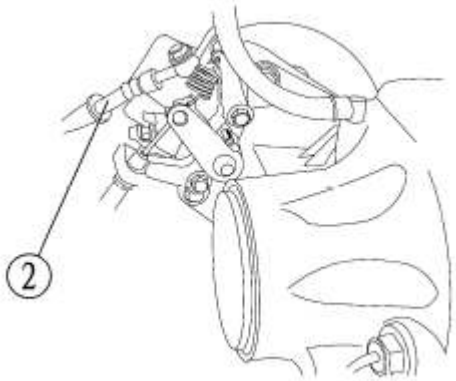
***Warning:***
***Whenever any service has been performed on the brake calipers or Pads make sure to pump up the brakes before driving the vehicle.***

## CHECKING THE BRAKE HOSES AND BRAKE LINES

1. Remove the Driver's, passenger's seat.
2. Lift up the hood.
3. Lift up the cargo bed.

Inspect the Front Brake hoses (1) and the Rear Brake Hoses (2). Look for cracks, wear, or damage. Look for fluid leaks.




***Note:***
***Apply pressure to the brake pedal while inspecting for leaks.***

## BLEEDING THE HYDRAULIC BRAKE SYSTEM

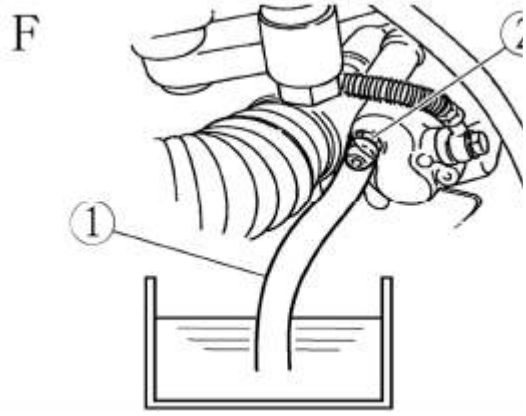
***Warning:***
***Bleed the brake system if:***

- ***The system has been disassembled.***
- ***A brake hose or brake line has been loosened or removed.***
- ***The brake fluid has been very low.***
- ***The brake operation has been faulty.***

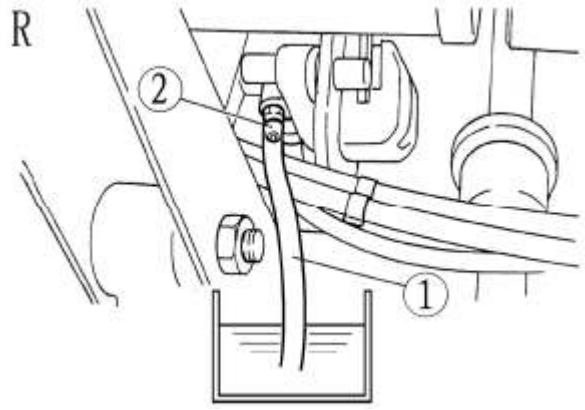
***A loss of braking performance may occur if the brake system is not properly bled.***

Bleeding Procedure

1. Add the proper brake fluid to the reservoir.
2. Install the diaphragm. Be careful not to spill any fluid or allow the reservoir to overflow.
3. Connect the clear plastic hose (1) tightly to the caliper bleed screw (2).




F Front



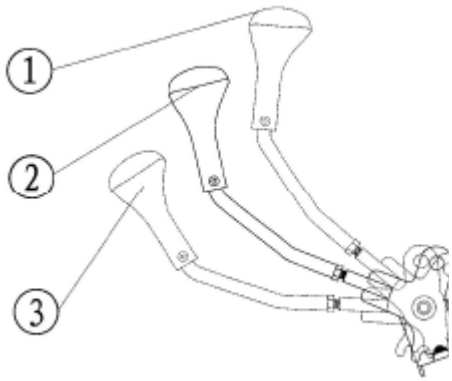

R Rear

4. Place the other end of the hose into a container.
5. Slowly apply the brake pedal several times.
6. Push down on the pedal and hold it.
7. Loosen the bleed screw and allow the pedal to travel towards its limit.
8. Tighten the bleed screw when the pedal limit has been reached, then release the pedal.
9. Repeat steps (5) to (8) until all the air bubbles have disappeared from the fluid.
10. Tighten the bleed screw.
11. Add brake fluid to the proper level.

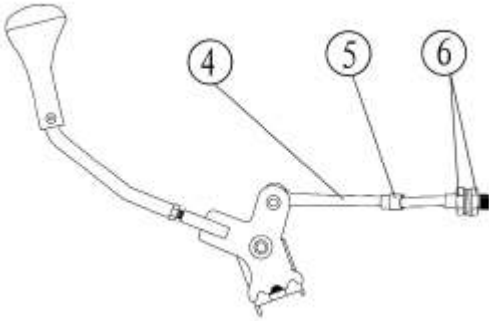
***Warning:***
***Check the operation of the brake after bleeding the brake system.***

**ADJUSTING THE SELECT LEVER SHIFT ROD**

Forward (1)
Neutral (2)
Reverse (3




Select Lever shift rod (4)
Plastic cover (5)
Both Lock Nuts (6)




***Warning:***
**Before shifting, you must stop the vehicle and take your foot off the accelerator pedal. Otherwise, the transmission may be damaged**

1. Make sure the select lever is in NEUTRAL.
2. Loosen both locknuts (6).

***Note:***
***The select lever shift rod locknut (select lever side) has left-handed threads. To loosen the locknut , turn it clockwise.***

3. Tighten the lock nuts (6).

## ADJUSTING THE BRAKE LIGHT SWITCH

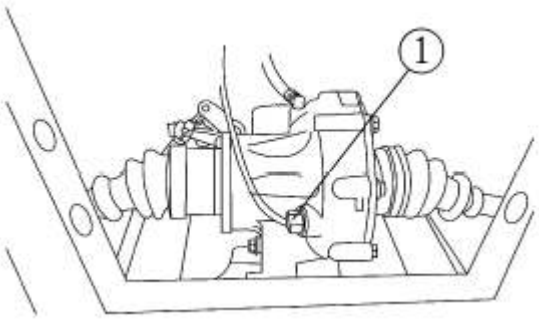
***Note:***
***The brake light switch is operated by movement of the brake pedal. The brake light switch is properly adjusted when the brake light comes on just before the braking effect starts.***

1. Check the timing of the brake light.
2. Adjustment procedure.
   - Hold the main body of the brake light switch (1) so that it does not rotate and turn the adjusting nut (2) in direction (a) or (b) until the brake light comes on at the proper time.

| | |
|---|---|
| Direction ⓐ | Brake light comes on sooner. |
| Direction ⓑ | Brake light comes on later. |

## CHECKING THE FINAL GEAR OIL LEVEL

1. Place the vehicle on a level surface.
2. Remove the oil filler plug (1)




3. Check the oil level.
   - Oil level should be up to the brim of the hole.

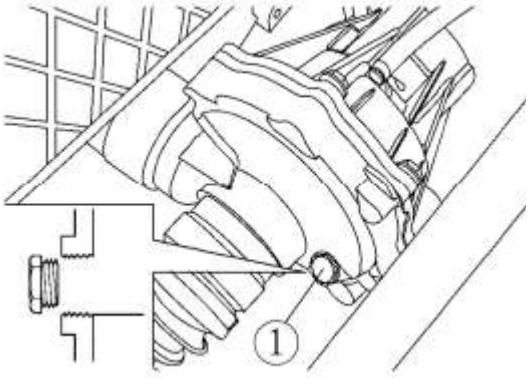
**Recommended oil**
**SAE 80 API "GL-4" Hypoid gear oil**

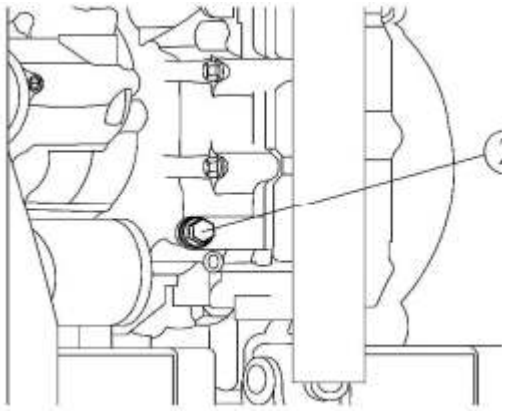
4. Install the oil filler plug.

**Tightening torque**
**23 Nm (2.3 m·kgf, 16.3 ft·lbs)**

## CHANGING THE FINAL GEAR OIL

1. Place the vehicle on a level surface.
2. Place a container under the final gear case to collect the used oil.
3. Remove the oil filler plug (1) and the Final gear oil drain bolt (2).



4. Fill the final gear case.

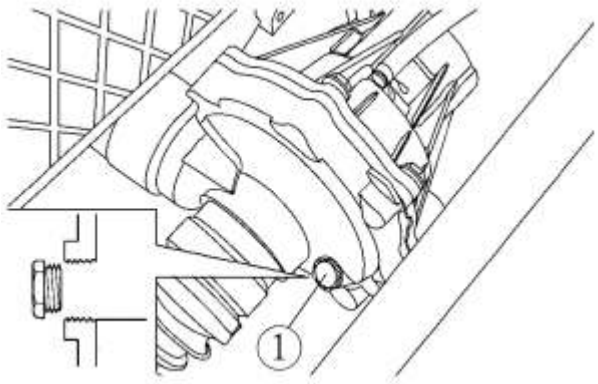
**Periodic oil change**
**0.25 L (0.22 Imp qt)**
**Total amount**
**0.28 L (0.25 Imp qt)**
**Recommended oil**
**SAE 80W/90 API "L-CLE" Hypoid gear oil**

5. Install the oil filler plug and Final gear oil drain bolt.

**20 Nm (2.0 m·kgf, 14 ft·lbs )**

**CHECKING THE DIFFERENTIAL GEAR OIL**

1. Place the vehicle on a level surface.
2. Remove the differential gear oil filler bolt and check the oil level. It should be up to the brim of the filler hole. If the level is low, add sufficient oil of the recommended type to raise it to the specified level.Differential gear oil drain bolt (1).




3. Install the oil filler plug.

**23 Nm (2.3 m · kg, 17 ft · lb)**

**CHANGING THE DIFFERENTIAL GEAR OIL**

1. Place the vehicle on a level surface.
2. Place a receptacle under the differential gearcase.
3. Remove the Differential gear oil drain bolt on the bottom of the gearcase.
4. Drain the differential gear oil.
5. Install the drain plug.

6 **m (1.0 m · kg, 7.2 ft · lb)**

6. Fill the differential gear case.

**Periodic oil change**
**0.25 L (0.22 Imp qt, 0.26 US qt)**
**Total amount**
**0.28L (0.25 Imp qt, 0.3 US qt)**
**Recommended oil**
**SAE 80W/90 API"L-CLE" Hypoid gear oil**

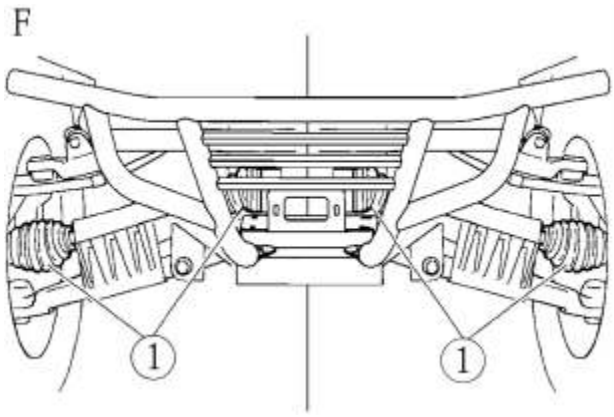
***Note:***
***If gear oil is filled to the brim of the oil filler hole, oil may start leaking from the differential gear case breather hose. Therefore, check the quantity of the oil, not its level.***

7. Install the oil filler plug.

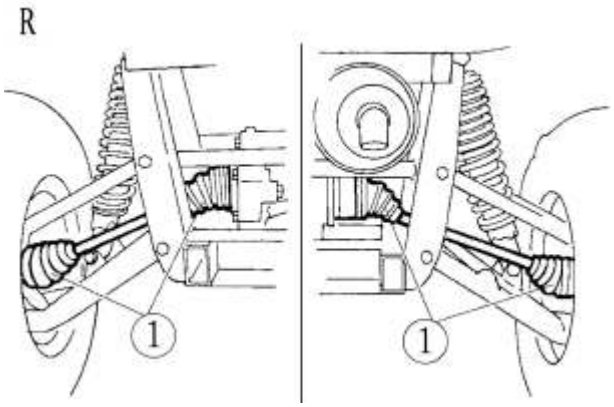
**23 Nm (2.3 m · kg, 17 ft · lb)**

## CHECKING THE CONSTANT VELOCITY JOINT DUST BOOTS

Inspect the dust boots (1) for cracks or damage.

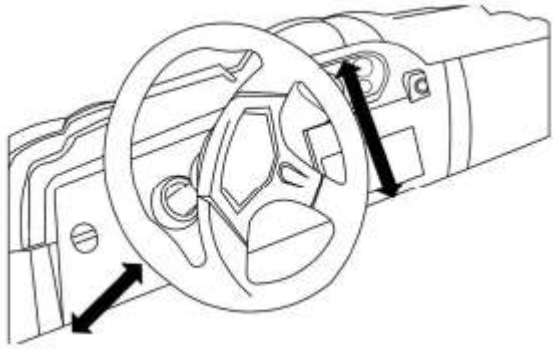



Front




Rear

## CHECKING THE STEERING SYSTEM



1. Inspection:

Place the vehicle on a level surface.

Inspect the steering assembly bearings, Try to move the steering wheel up and down, and back and forth. If there is excessive play, replace the steering shaft assembly.

Inspect the tie-rod ends.

Turn the steering wheel to the left and right
until it stops completely, and then move the steering wheel slightly in the opposite direction. If the Tie-rod end (s) have vertical play, replace the tie-rod end(s).

Raise the front end of the vehicle so that there is no weight on the front wheels.

Inspect the Ball Joints

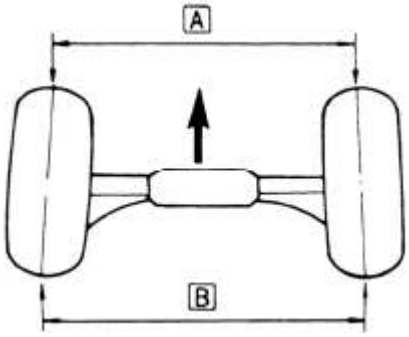
Move the wheels laterally back and forth. If there is excessive play, replace the front arms ( upper and Lower) and or the wheel bearings.

**ADJUSTING THE TOE-IN**

Place the vehicle on a level surface.

Check the tire air pressure, then measure the toe in.

Mark both front tire tread centers at 90 degrees from the floor toward the front of the vehicle. Face the steering wheel straight ahead.
Measure distance (A) between the marks.




- Rotate the front tires 180° until the marks are exactly opposite one another.

- Measure distance (B) between the marks.
- Calculate the toe-in using the formula given below.

**Toe In = (B)-(A)**

**Toe-in**
**0 ~ 10 mm (0.00 ~ 0.39 in)**
**(with tires touching the ground)**

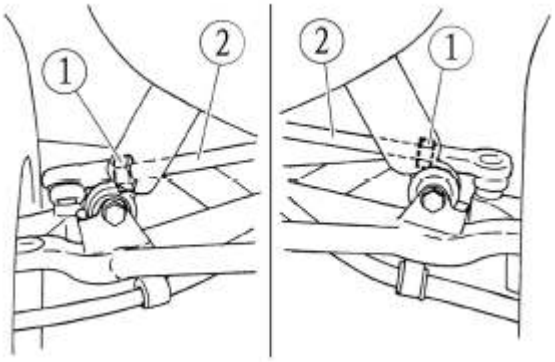
**Adjustment**

***Warning:***
***Be sure that both tie-rods are turned the same amount. If not, the vehicle will drift right or left even though the steering wheel is positioned straight. This can lead to mishandling and an accident.***
***After setting the toe-in to specification, run the vehicle slowly for some distance with both hands lightly holding the steering wheel and check that the steering wheel responds correctly. If not, turn either the right or left tie -rod within the toe -in specification.***

Mark both tie-rods ends. This reference point will be needed during adjustment.

- Loosen the locknut (tie-rod end) (1)on each tie-rod.
- The same number of turns should be given to both the right and left tie-rods (2) until the specified toe-in is obtained. This is to keep the length of the rods the same.
- Tighten the rod end locknut on each tie-rod.

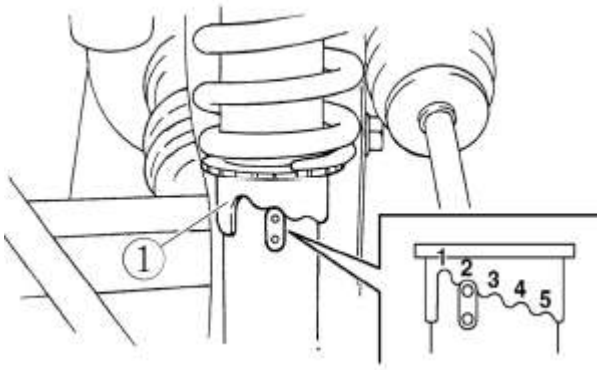
**Locknut (rod end)**
**40 Nm (4.0 m · kg, 29 ft · lb)**



## ADJUSTING THE FRONT SHOCK ABSORBERS

***Warning:***
**Always adjust both shock absorbers spring preload to the same setting. Uneven adjustment can cause poor handling and loss of stability.**

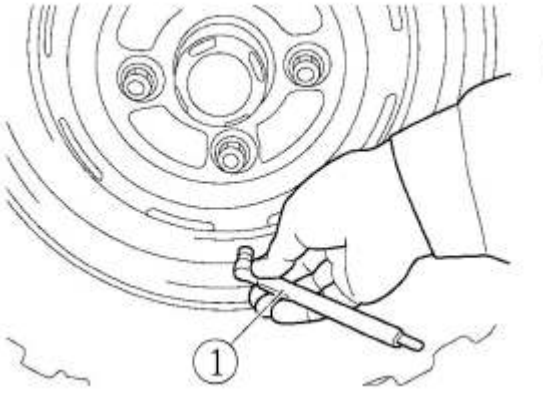
**Adjustment**
Turn the spring preload adjuster (1) to increase or decrease the spring preload.




**Standard position: 2**
**Minimum (Soft) position: 1**
**Maximum (Hard) position: 5**

## CHECKING THE TIRES

***Warning:***
***Tire characteristics influence the handling of the vehicle. If other tire combinations are used, they can adversely affect your vehicle's handling characteristics and are therefore not recommended.***




| | Size | Type |
|---|---|---|
| Front | 25 × 8-12 | Rawhide RS |
| Rear | 25× 10-12 | Rawhide RS |

**Recommended tire pressure**
**Front 70Kpa or 10 psi**
**Rear 70KPa or 10 psi**

***Tire pressure below the minimum specification could cause the tire to dislodge from the rim under severe riding conditions.***

***Use no more than***
***Front 77Kpa or 12 psi***
***Rear 77Kpa or 12 psi***
***when seating the tire beads. Higher pressure may cause the tire to burst.***
***Inflate the tires slowly and carefully. Fast inflation could cause the tire to burst.***

***MAXIMUM LOADING LIMIT***

***350 lb capacity rear manual dump bed***

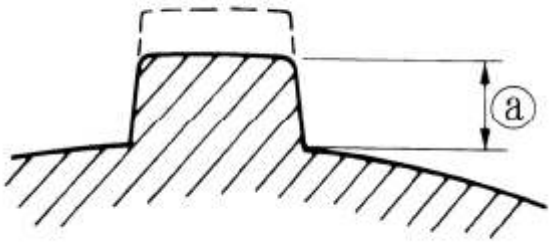
***1200 lb towing capacity***

***Note:***
**The tire pressure gauge (1) is included as standard equipment. If dust or the like is stuck to this gauge, it will not provide the correct readings.**
**Therefore, take two measurements of the tire's pressure and use the second reading.**

***Warning:***
***Uneven or improper tire pressure may adversely affect the handling of this vehicle and may cause loss of control.***
***• Maintain proper tire pressures.***
***• Set tire pressures when the tires are cold.***
***• Tire pressures must be equal in both* front *tires and equal in both rear tires.***

Check the Tire wear

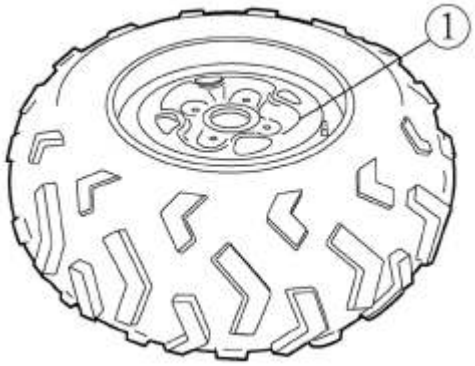
**Tire wear limit (a)**
**Front and rear: 3.0 mm (0.12 in)**




***Warning:***
***It is dangerous to ride with a worn-out tire. When tire wear is out of specification, replace the tire immediately.***

**INPECTING THE WHEELS (1)**

Look for Bends or damage.




- ***Never attempt even small repairs to the wheel.***
- ***Ride conservatively after installing a tire to allow it to seat itself properly on the rim.***

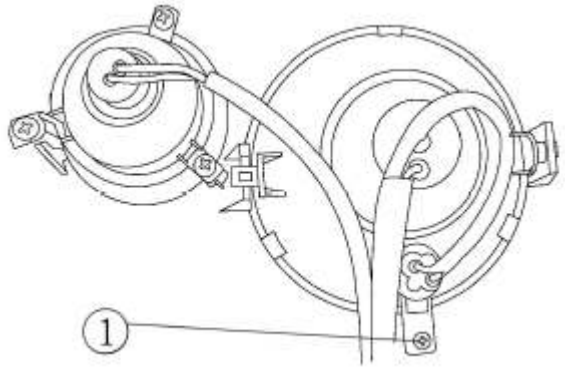
**CHECKING AND LUBRICATING THE CABLES**

***Warning:***
***A damaged cable sheath may cause corrosion and interfere with the cable***
***movement. An unsafe condition may result so replace a damaged cable as soon as possible.***

Hold the cable end up and apply several
drops of lubricant to the cable.

## ADJUSTING THE HEADLIGHT BEAM

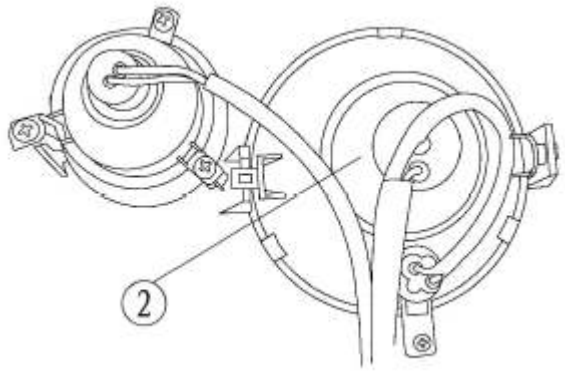
1. Turn the headlight beam adjuster (1) in or out.




| | |
|---|---|
| Turning in | Headlight beam raised. |
| Turning out | Headlight beam lowered. |

## CHANGING THE HEADLIGHT BULB

1. Lift up the hood
2. Pull back the headlight holder cover (2)




3. Remove the headlight bulb holder (with bulb) (3) and remove the bulb by unhooking the headlight bulb holder tabs.
4. Install a new headlight bulb into the holder.

***Note:***

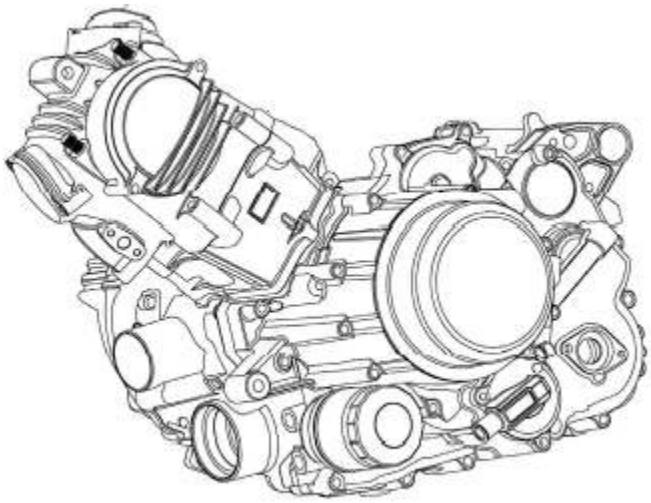
**Avoid touching the glass part of the bulb. Keep it free from oil; otherwise, the transparency of the glass, life of the bulb, and luminous flux will be adversely affected. If oil gets on the bulb, thoroughly clean it with a cloth moistened with alcohol or lacquer thinner.**

5. Pull the headlight bulb holder cover back into place.
6. Close the hood.

### CHANGING THE TAIL/BRAKE LIGHT BULB

1. Pull back the bulb holder cover
2. Remove the bulb holder with bulb
3. Remove the bulb.
4. Install a new bulb
   Be careful not to touch the glass part of the new bulb when installing.
5. Install the bulb holder and pull the bulb holder cover back into place.

# Engine




| | | | |
|---|---|---|---|
| **Engine Notes** | **4-3** | **Clutch** | **4-35** |
| **Engine removal** | **4-4** | **Clutch Housing Assembly** | **4-36** |
| **Cylinder head and Cylinder head cover** | **4-5** | **Crankcase, Starter Motor and Oil Filter** | **4-39** |
| **Rocker Arms and camshaft** | **4-9** | **Crankcase** | **4-41** |
| **Valves and valve springs** | **4-13** | **Crankcase Bearings** | **4-42** |
| **Cylinder and Piston** | **4-18** | **Crankshaft and oil Pump** | **4-45** |
| **Engine cooling fan and A.C. magneto** | **4-22** | **Oil Pump** | **4-46** |
| | | **Transmission** | **4-49** |
| **Balancer Gears and Oil Pump Gears** | **4-27** | **Drive Axle Assembly** | **4-50** |
| **Primary and Secondary Sheaves** | **4-29** | **Middle Drive shaft** | **4-53** |
| | | **Middle Driven shaft** | **4-54** |
| **Primary Sheave** | **4-30** | **Intake Manifold Assembly** | **4-58** |
| **Secondary Sheave** | **4-31** | | |

**Engine Notes**

1. Make sure the components, oils, adhesives, and sealants are from the motor company or recommended by the motor company.

2. Always replace oil seals, gaskets, O-rings, and piston rings when disassembled.

3. Protect parts when removed, clean and lubricate.

4. Keep disassembled parts orderly to assist in the rebuild process.

5. When tightening nuts and bolts, unless otherwise noted tighten the largest diameter bolts first, inside to outside in a cross pattern in multiple steps. Then work down to next largest diameter bolt.

6. When removing nuts and bolts take out the smallest diameter bolts first and work in reverse of the tightening method used in step 5.

7. Always replace bolts with sealant applied to them.

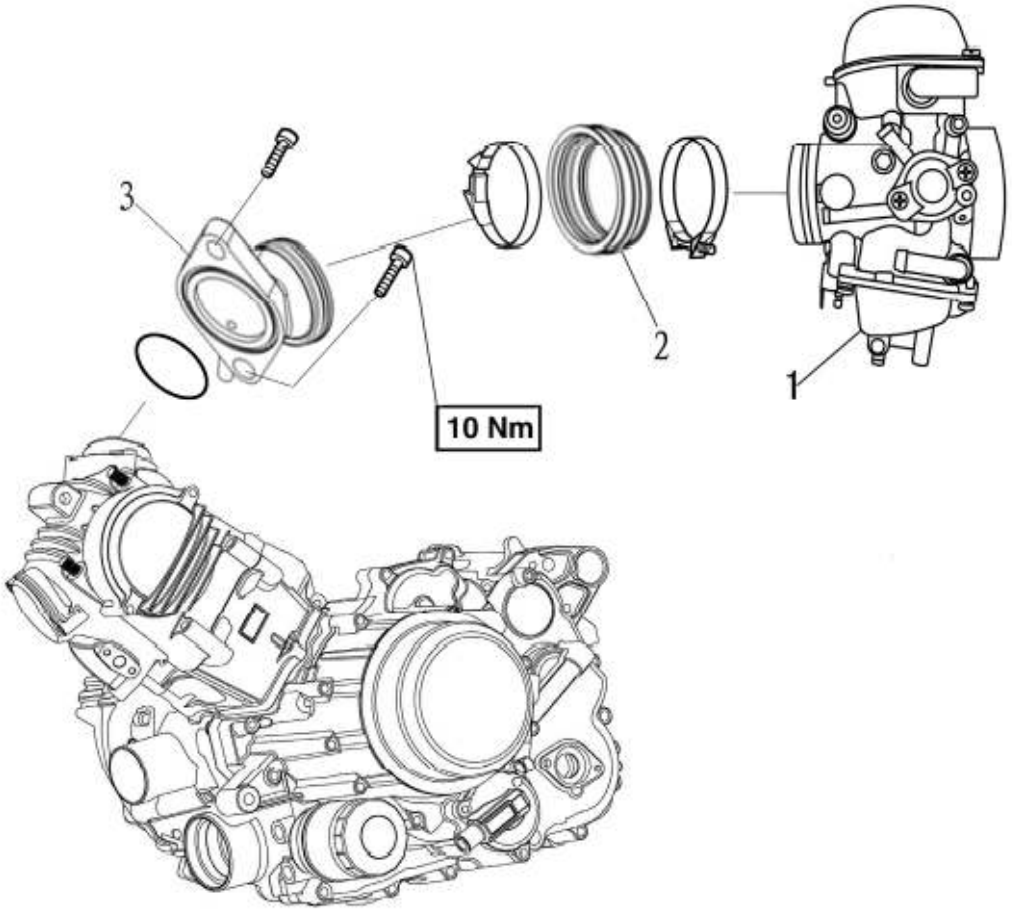
8. Always assemble bearings so that the manufacturer's logo or number is facing outward.

9. Pay attention to oil seals that they are installed correctly, without damage.

10. Clean all gasket surfaces before reassembly.

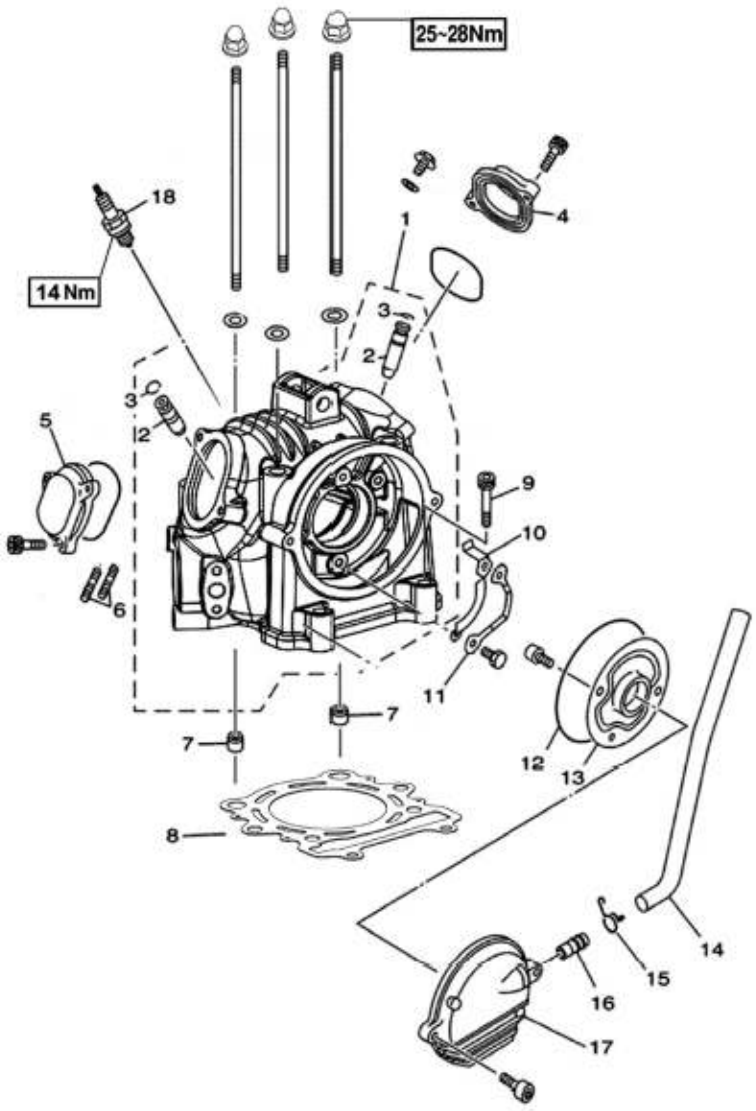
11. Pay attention to oil holes and the lubrication system when assembling.

## Engine Removal



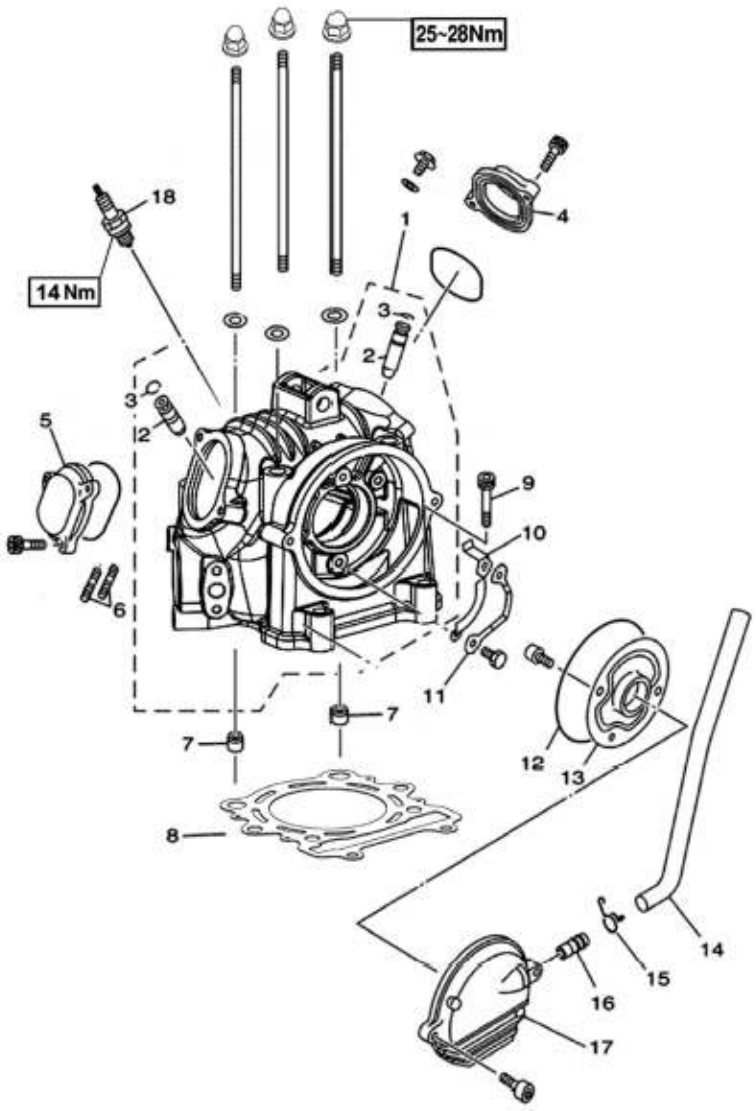

| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| | **Removing the carburetor and intake manifold** | | Remove the parts in the order listed |
| 1 | Carburetor | 1 | |
| 2 | Carburetor joint (intake manifold) | 1 | For installation, reverse the order |
| 3 | Intake Manifold | 1 | listed |

## Cylinder Head and Cylinder Head Cover




| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| | **Removing the cylinder head cover and cylinder head** | | Remove the parts in the order listed. |
| 1 | Cylinder head | 1 | |
| 2 | Valve Guide | 2 | |
| 3 | Check ring | 2 | |
| 4 | Intake Valve cover | 1 | |
| 5 | Exhaust Valve Cover | 1 | |
| 6 | Stud bolt M8 X 45 | 2 | |
| 7 | Cotter Pin | 1 | |
| 8 | Head Gasket | 1 | |

## Cylinder Head and Cylinder Head Cover




| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| 9 | Inner hex cylinder screw M8 X 50 | 2 | |
| 10 | Cam pressure plate | 1 | |
| 11 | Cam stop | 1 | |
| 12 | Seal o-ring 109×2.4 | 1 | |
| 13 | Fuel shield plate comp | 1 | |
| 14 | Exhaust pipe | 1 | |
| 15 | Clip clamp | 1 | |
| 16 | Seal o-ring 109×2.4 | 1 | |
| 17 | Cylinder head left cover | 1 | For installation, reverse the order |
| 18 | Spark plug (NGK DR8EA) | 1 | listed. |

**Inspection**

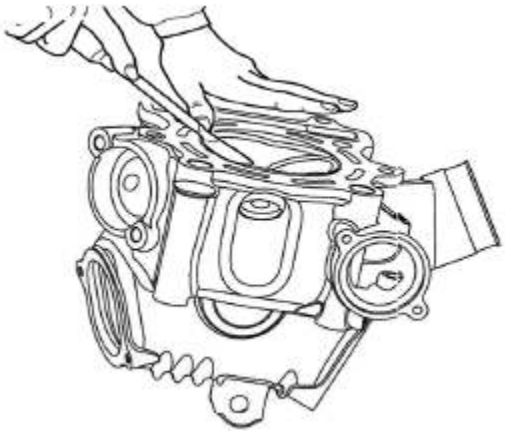
**Valve covers**

- Exhaust Valve cover (1)
- Intake Valve cover (2)

Look for cracks or damage. Lubricate with grease and replace the o-rings (3).

**Cylinder Head**

- Eliminate carbon deposits from the combustion chamber using a rounded scraper.



***Note:***
**Do not use a sharp instrument to avoid damaging or scratching:**

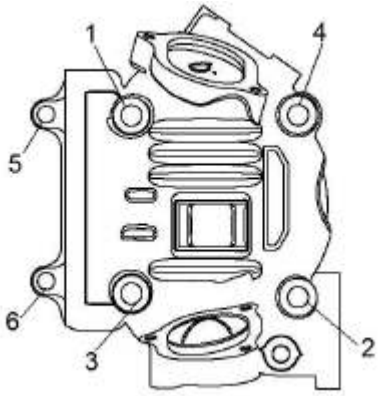
- **spark plug threads**
- **valve seats**

Look for scratches or damage, if necessary replace the cylinder head and the cylinder head cover as a set.

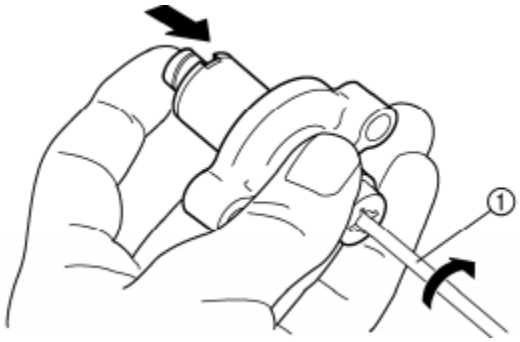
Look at the cylinder head water jacket for mineral deposits or rust. Clean if necessary.

**Installation**

1. Install a new Cylinder Head Gasket.
2. Install the Cylinder Head
3. Install bolts M9 in positions 1-6 in order and torque in two stages to 38 Nm or 28 ft lbs.
4. Install bolts M6 and torque to 10 Nm or 7 ft lbs




5. Install the timing chain guide (exhaust side)
6. Install the timing chain tensioner
    - Lightly press the timing chain tensioner rod into the timing chain tensioner housing by hand.
    - While pressing the timing chain tensioner rod, wind it clockwise with a thin screwdriver (1) until it stops.
    - With the screwdriver still inserted into the timing chain tensioner, install the timing chain tensioner and gasket onto the cylinder block. Then, tighten the timing chain tensioner bolts to the specified torque.




***Warning:***
***Always use a new gasket.***

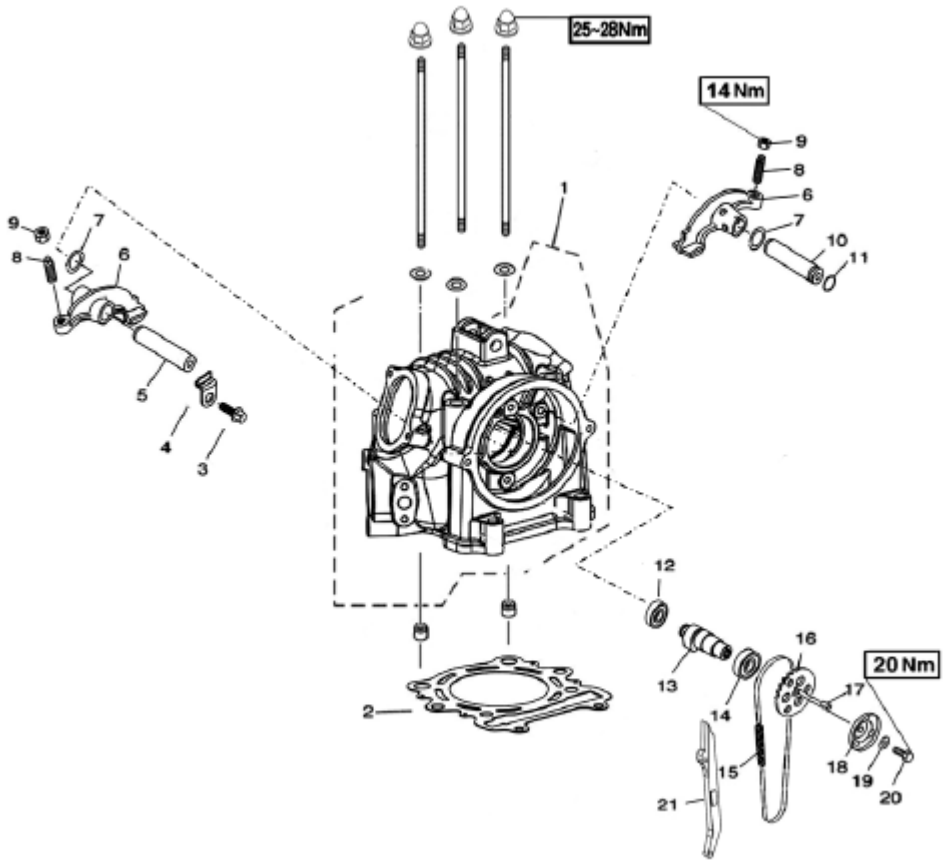
***Note:***
***The "UP" mark on the timing chain tensioner should face up.***

**Timing chain tensioner bolt**
**(10 Nm or 7 ft lbs)**

- Remove the screwdriver, make sure that the timing chain tensioner rod releases, and tighten the cap bolt to the specified torque.

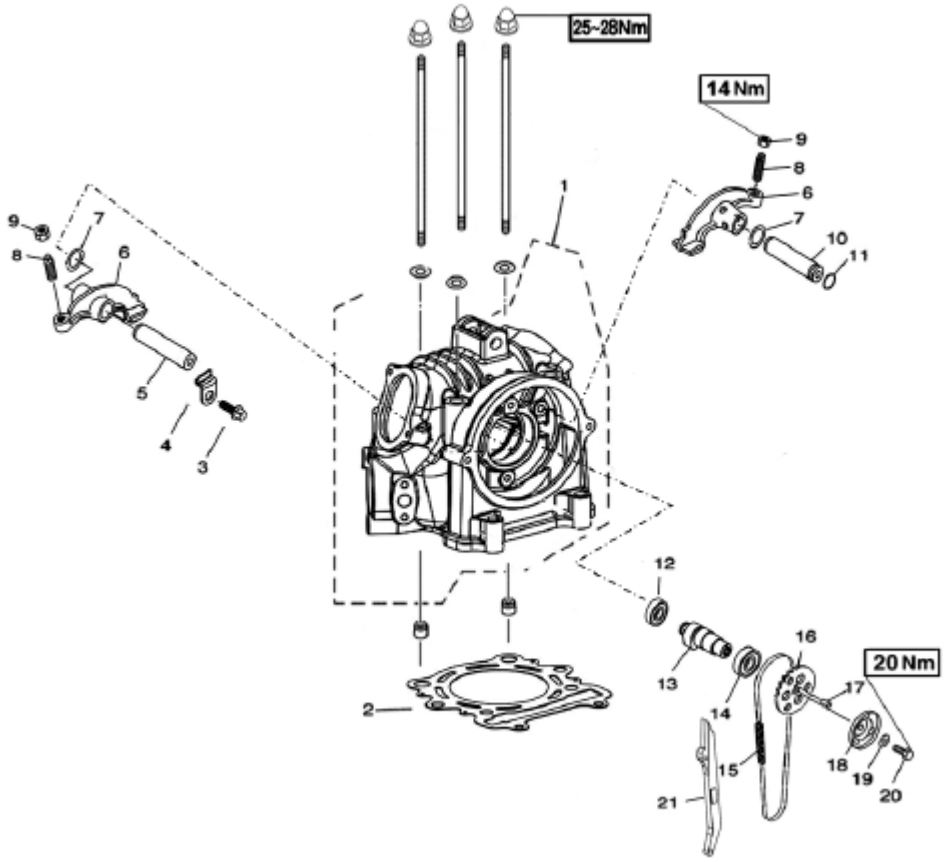
**Timing chain tensioner cap bolt**
**(7 Nm or 5 ft lbs)**

## Rocker Arms and Camshaft




| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| | **Removing the rocker arms and camshaft** | | Remove the parts in the order listed. |
| 1 | Cylinder head | 1 | |
| 2 | cylinder head gasket | 1 | |
| 3 | Hex bolt M6×16 | 1 | |
| 4 | Pressure plate | 1 | |
| 5 | Shaft, swing arm | 1 | |
| 6 | Swing arm comp, valve | 2 | |
| 7 | wave washer | 2 | |
| 8 | Adjusting screw, valve | 2 | |
| 9 | Adjusting nut, valve | 2 | |
| 10 | Shaft, swing arm | 1 | |
| 11 | Seal O-ring 8.8×2 | 2 | |
| 12 | Bearing 6004Z | 1 | |
| 13 | Camshaft | 1 | |

## Rocker Arms and Camshaft




| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| 14 | Bearing 6005 | 1 | |
| 15 | Timing chain | 1 | |
| 16 | Driven sprocket, timing | 1 | |
| 17 | pin 4×10 | 1 | |
| 18 | Shield plate, driven sprocket | 1 | |
| 19 | Washer 10.5×22×3 | 1 | |
| 20 | Hex flange bolt M6×25 | 1 | For installation, reverse the order |
| 21 | Guide plate | 1 | listed. |

**Inspection**

**Rocker Arms**

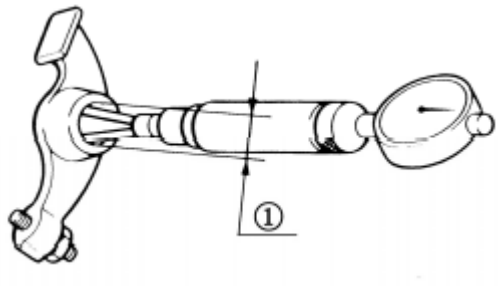
- Rocker arm Lobes (1)
- Valve Adjusters (2)

Look for discoloration, pitting or scratches.

- Rocker Arms
- Rocker Arm shafts

Look for damage or wear. Look at the oil hole for blockage.

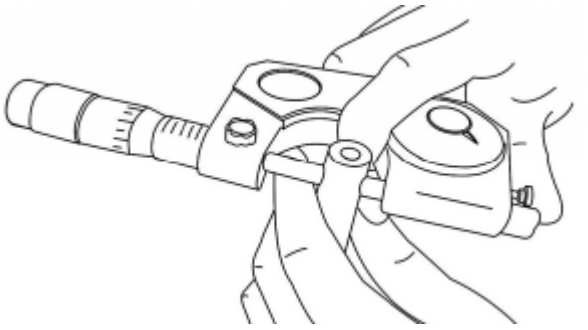
Measure the inside diameter of the rocker arm hole (1).




**Rocker arm inside diameter**
**Service Wear Limit**
**Φ12.02mm**

Look at the Rocker arm shafts for wear, pitting or scratches.

Measure the rocker arm shaft outside diameter.



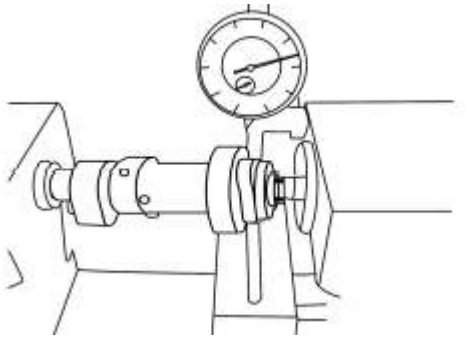
**Rocker arm shaft outside diameter**
**Service Wear Limit**
**Φ11.96mm**

Calculate the clearance by subtracting the shaft outside diameter from the rocker arm hole inside diameter.

**Rocker arm to shaft clearance**
**Service Wear limit**
**0.05mm**

Look at the cam lobes for pitting, scratches or discoloration.

Look at the camshaft journal for wear or damage.



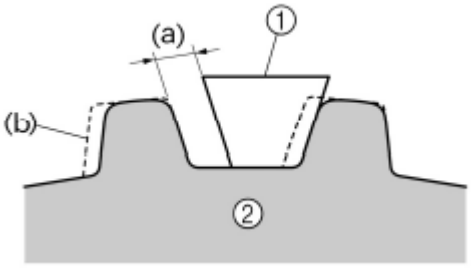
Measure the external diameter of the journal with a micrometer.

Look at the small holes on the camshaft sprocket and the rotor “I” mark for alignment.

Look at the camshaft sprocket for wear or damage. If necessary replace the camshaft sprocket and cam chain as a set.

Follow the diagram for proper cam chain to sprocket fitment.

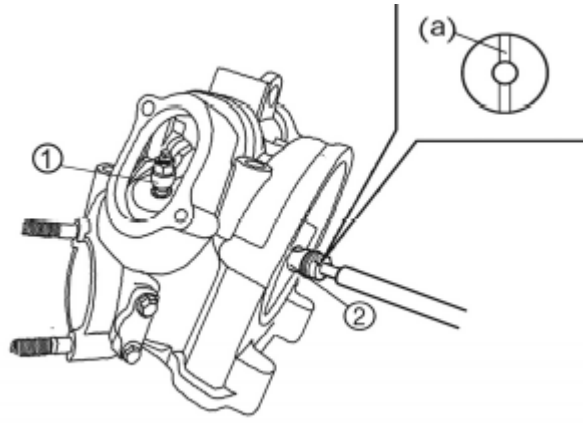
(a)1/4 of a tooth
(b)Correct
(1)Timing chain
(2)Sprocket




**Installation**

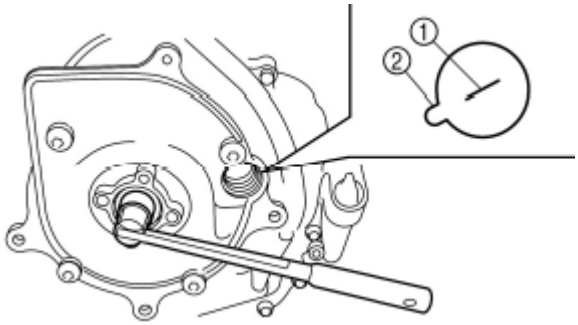
Install the rocker arms (1) and the rocker arm shafts (2).

***Note:***
***The thread hole (a) of the rocker arm shaft must face to the outside.***
***After installation, make sure that the thread hole (a) of the rocker arm shaft is positioned correctly, as shown in the illustration.***




Install the camshaft and camshaft sprocket.

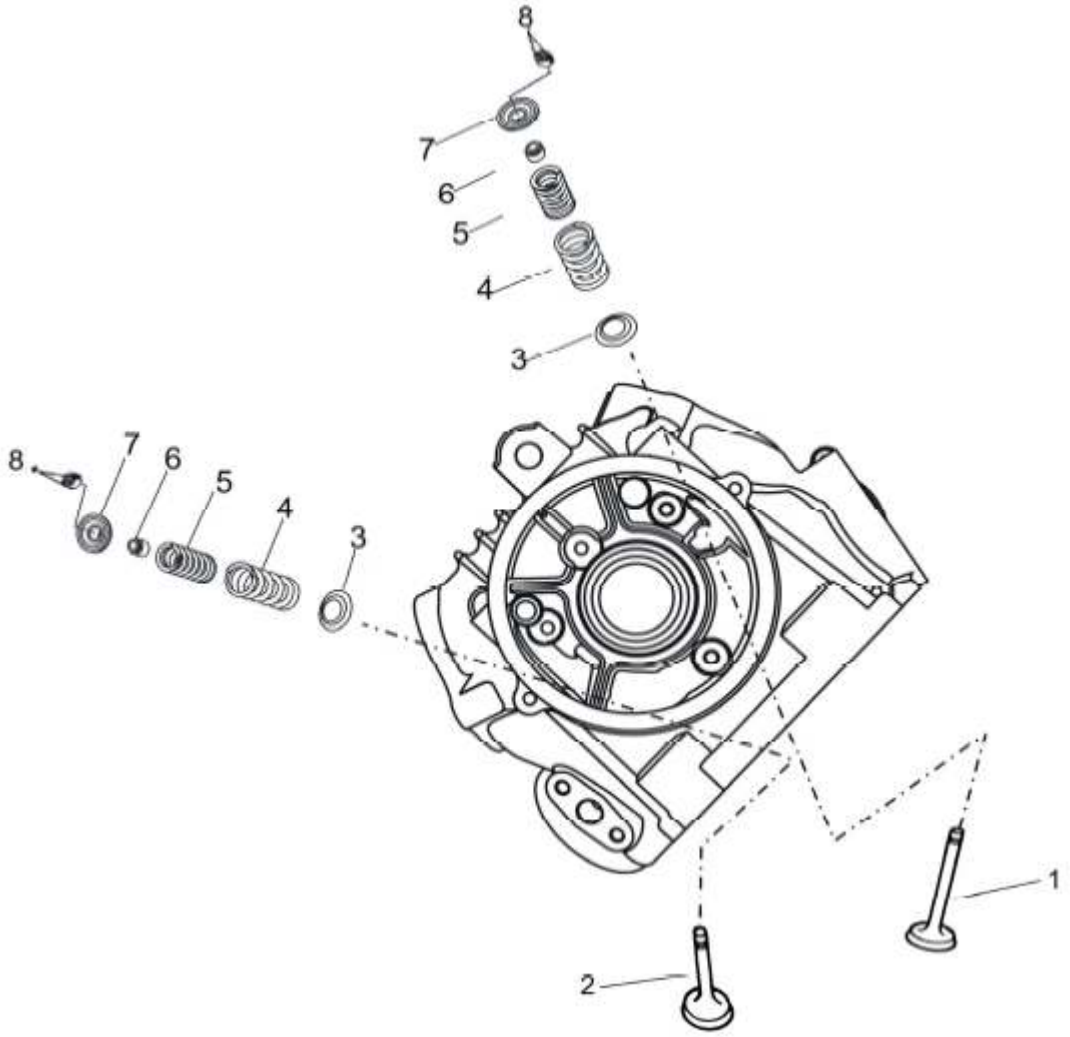
- Turn the crankshaft counterclockwise with a breaker bar.
- Align the “I” mark (1) on the rotor with the stationary pointer (2) on the A.C. magneto cover.




When the “I” mark is aligned with the stationary pointer, the piston is at Top Dead Center (TDC).

***Caution:***
**Do not turn the crankshaft during the camshaft installation.**

## Valves and Valve Springs

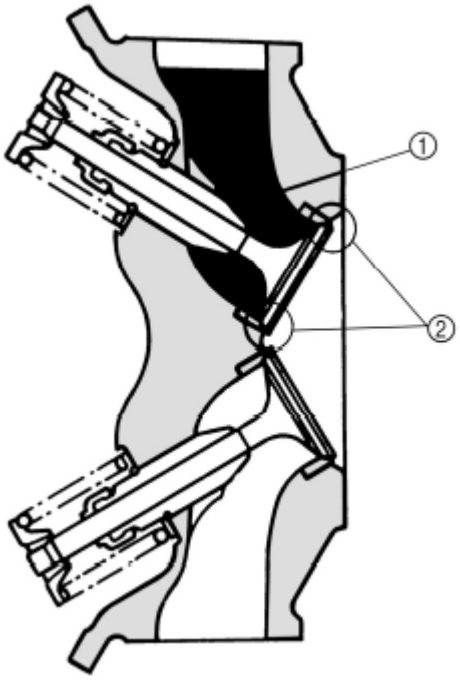



| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| | **Removing the valves and valve springs** | | Remove the parts in the order listed. |
| | Cylinder Head | | |
| 1 | Intake Valve | 1 | |
| 2 | Exhaust Valve | 1 | |
| 3 | Valve spring seat | 2 | |
| 4 | Valve spring (outer) | 2 | |
| 5 | Valve spring (inner) | 2 | |
| 6 | Valve seal | 2 | |
| 7 | Valve spring cap | 2 | For installation, reverse the order listed. |
| 8 | Valve Keeper | 4 | |

**Inspection**

Check for valve sealing.

- Pour a clean solvent (1) into the intake and exhaust ports.
- Check that the valve seals properly. There should be no leakage at the valve seat (2).




Remove the valves and look at the valve face for pitting or wear. Grind the face if necessary.

Look at the valve stem for mushrooming. If the diameter is larger than the body of the stem, replace the valve.

Look at the valve seats for pitting or wear. If necessary reface the valve seats.

Measure the valve surface width.

**Service Wear Limit**
**2.0mm**

Measure the stem to guide clearance.

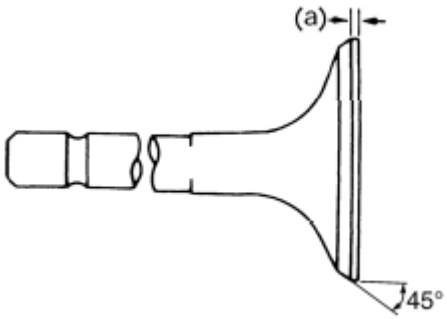
**Stem-to-guide clearance = valve guide inside diameter – valve stem diameter.**

***Note:***
**If the mating surface is coarse, corroded or does not contact with valve seat normally, replace it.**

**Stem-to-guide clearance**
**Service Wear Limit**
**Intake:0.12mm Exhaust:0.14mm**

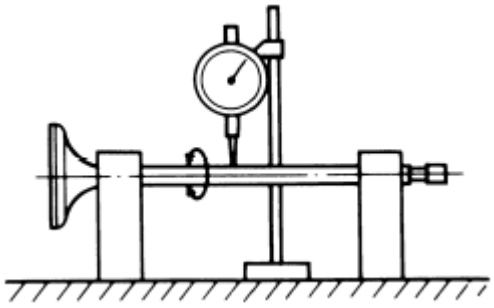
Measure the margin thickness (a).

**Margin thickness**
**Intake:1.2 mm**
**Exhaust:1 mm**




Measure the valve stem runout.

**Runout limit 0.01 mm**



***Note:***
**When installing a new valve always replace the guide. If the valve is removed or replaced always replace the oil seal.**

Measure the valve seat surface width.

- Paint the face of the valve with machinist dye (usually blue color)
- Install the valve into the cylinder head.
- Press the valve through the valve guide and onto the valve seat to make a clear pattern.
- Measure the valve seat width. Where the valve seat and valve face made contact, blue dye will have been removed.

**Service Wear Limit**
**3mm**

Measure the valve spring free length and squareness.

**Valve spring free length**
**valve outer spring：42.5mm**
**valve inner spring：39mm**

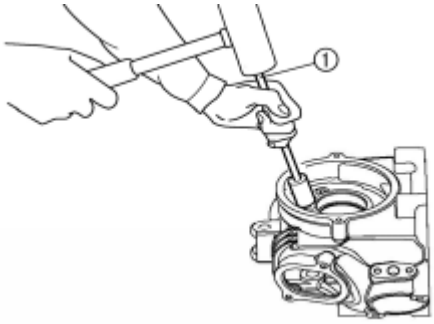
**Valve spring squareness**
**valve outer spring：0.10 mm**
**valve inner spring：0.10 mm**

Measure the valve spring compressed force (a), and the installed height (b).

**Compressed spring force**
**spring, valve outer：240~260 mm**
**spring, valve inner：110~130 mm**

Remove the valve guide using the valve guide removal-installation tool (1).

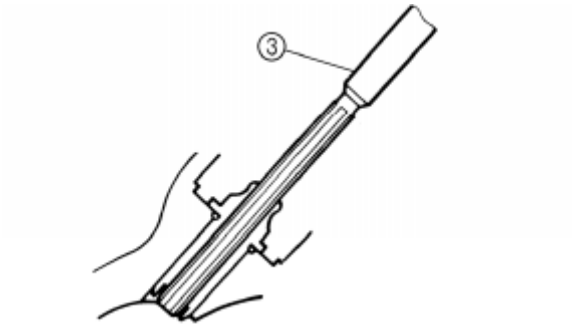
***Note:***
**To ease guide removal, installation and to maintain correct fit, heat the cylinder head to 100°C (212° F) in an oven.**




Install the new valve guide as shown above.

After installing the valve guide, bore the valve guide using a valve guide reamer (3) to obtain proper stem-to-guide clearance.

***Note:***
**After replacing the valve guide reface the valve seat.**

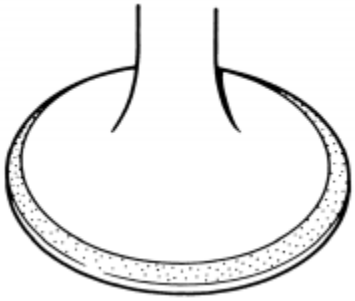



If the valve seat is to wide or narrow or cracked, grind it to ensure it's sealing ability.

***Note:***
**After reface the valve seat or replacing the valve and valve guide, the valve seat and valve face should be lapped.**

Apply Lapping compound to the face of the valve and the valve seat.

Turn the valve until the valve face and valve seat are evenly polished, then clean off all of the compound.



***Note:***
**For best lapping results, lightly tap the valve seat while rotating the valve back and forth between your hands.**

Apply a fine lapping compound to the valve face and repeat the above steps.

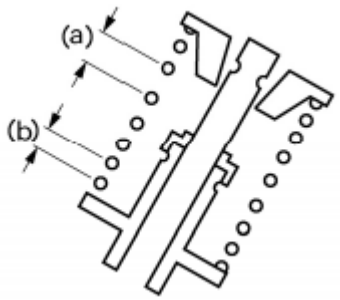
***Note:***
**After every lapping operation be sure to clean off all of the compound from the valve face and valve seat.**

**Installation**

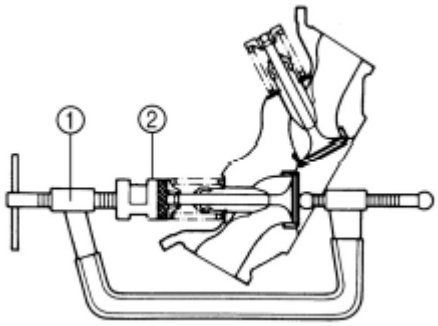
1). Apply:
- molybdenum disulfide oil (onto the valve stem and valve stem seal)

2). Install:
- valve spring seats
- valve stem seals
- valves
- valve springs
- valve spring retainers

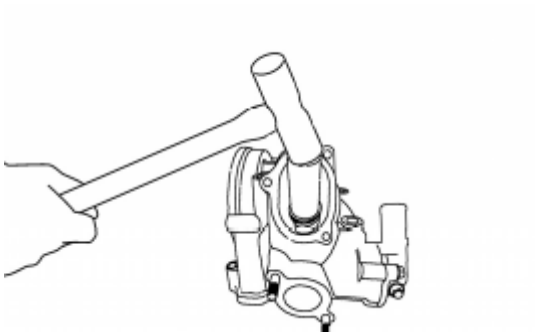
***Note:***
**Install the valve springs with the larger pitch (a) facing upwards.**



Using a valve spring compressor (1) install the valve retainers (2).

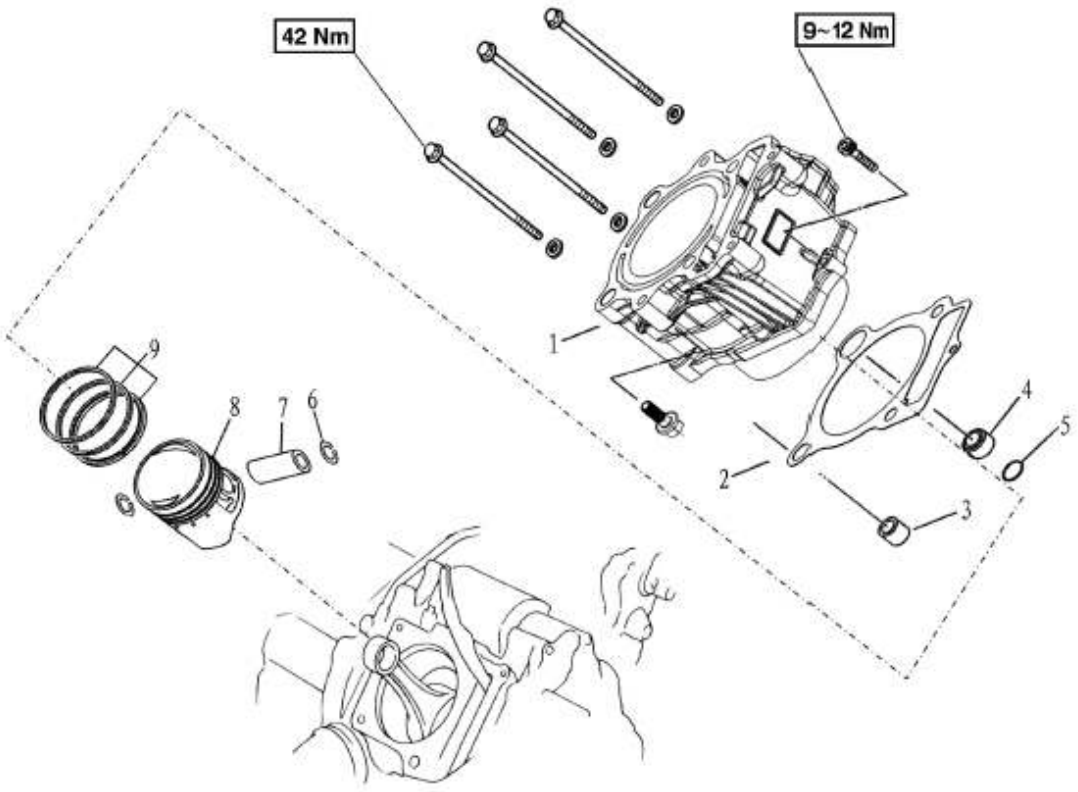



To secure the valve keepers onto the valve stem, lightly tap the valve tip with a soft faced dead blow hammer.



***Caution;***
**Hitting the valve tip with excessive force could damage the valve.**

## Cylinder and Piston



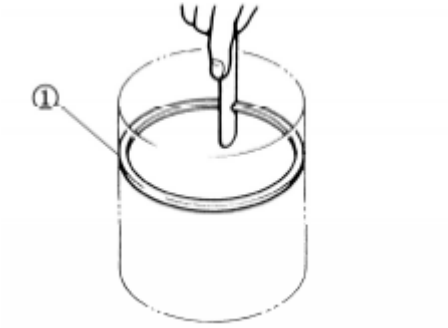

| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| | **Removing the cylinder and piston** | | Remove the parts in the order listed. |
| | Water Pump outlet hose | | |
| 1 | Cylinder | 1 | |
| 2 | Cylinder base gasket | 1 | |
| 3 | Dowel Pin 14 X 16 | 1 | |
| 4 | Dowel Pin 18 X 10 | 1 | |
| 5 | O-ring | 1 | |
| 6 | Piston pin clip | 2 | |
| 7 | Piston pin | 1 | |
| 8 | Piston | 1 | For installation, reverse the order |
| 9 | Piston ring set | 1 | listed. |

**Inspection**

Look at the cylinder and piston walls for vertical scratches. If scored bore the cylinder and replace the piston and rings.

Remove the piston rings from the piston, and inspect the ring groove for cracks or wear.

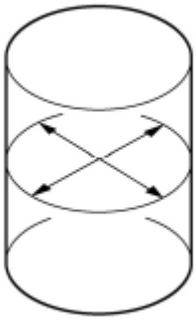
Insert the piston rings into the cylinder (1) and measure the end gap.




**Service Wear Limit**
**Top ring/2nd ring:0.5mm**

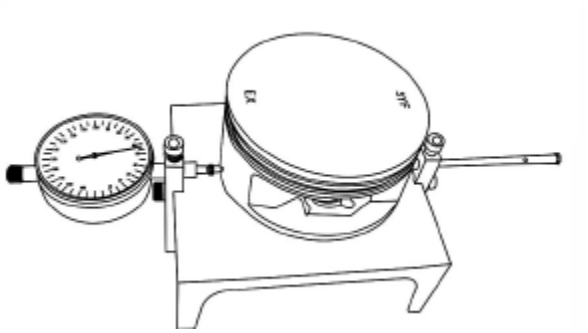
Look at the piston pin for discoloration or grooves. If any are found replace the piston pin and check the lubrication system.

Measure the cylinder at the top, middle and bottom for out of round and taper.



**Service Wear Limit**
**Out of roundness:0.005mm**
**Taper:0.005mm**

Measure the external diameter of the piston at 10mm above the piston skirt.



Calculate cylinder to piston clearance.

**Service Wear Limit**
**0.1mm**

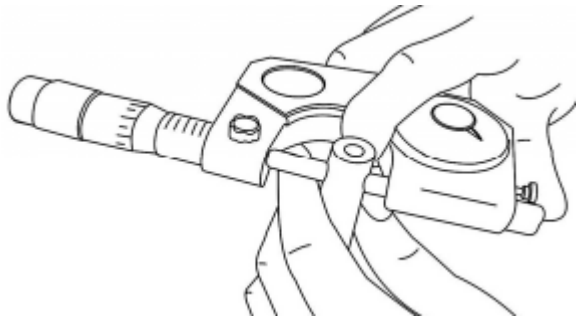
Measure the ring side clearance using a feeler gauge. If out of specification replace the piston and rigs as a set.

***Note:***
**Clean carbon from the piston ring grooves and rings before measuring the side clearance.**

| | Side clearance | |
|---|---|---|
| | Standard | Limit |
| Top ring | 0.04~0.08mm | 0.13mm |
| 2nd ring | 0.03~0.07mm | 0.13mm |

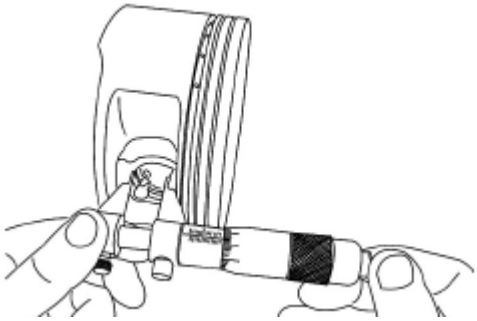
Measure the piston pin outside diameter.

Measure the piston pin outside diameter.



**Service Wear Limit**
**0.02mm**

Measure the piston pin bore inside diameter.



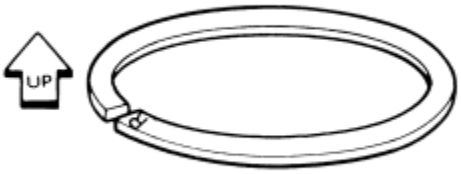
**Service Wear Limit**
**0.02mm**

Calculate the piston pin-to-piston clearance. Subtract piston pin outside diameter from pin pin bore inside diameter. If out of specification replace the piston.

**Installation**

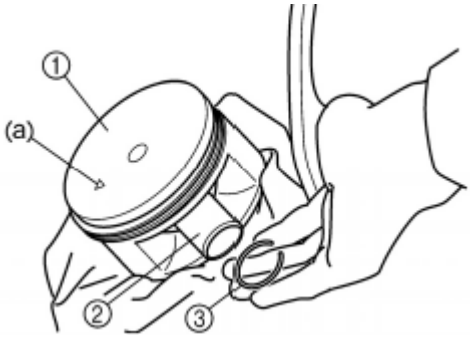
Install the Piston rings onto the piston.

***Note:***
**Be sure to install the piston rings so that the manufacturer's marks or numbers are located on the upper side of the rings. Lubricate the piston and piston rings liberally with engine oil.**




Install the piston onto the Connecting Rod.

- Piston (1)
- Piston Pin (2)
- Piston Pin Clips (3) (New replacement)




***Note:***
***Be sure that the arrow mark a on the piston points to the exhaust side of the engine. Before installing the piston pin clip, cover the crankcase with a clean rag to prevent the piston pin clip from falling into the crankcase.***

Install the cylinder

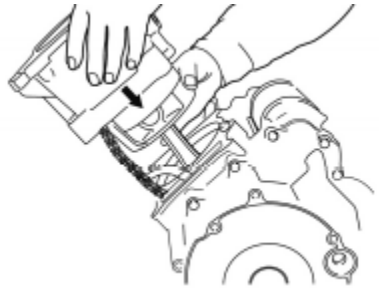
- Cylinder
- O-ring (base gasket)
- Bolts (M10, torque to 42 Nm or 30 ft lbs).
- Bolts (M6, torque to 10 Nm or 7 ft lbs).

***Note:***

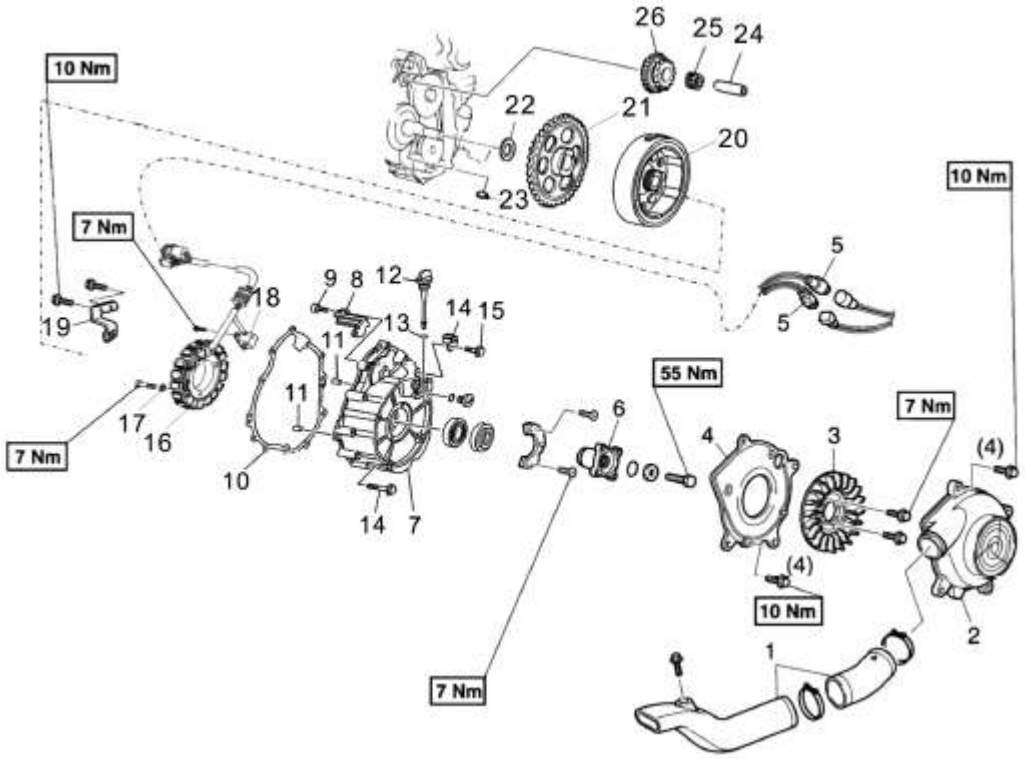
**Install the cylinder with one hand while compressing the piston rings with the other hand.**

***Caution:***

**Be careful not to damage the timing chain guide during installation. Pass the timing chain through the timing chain cavity.**

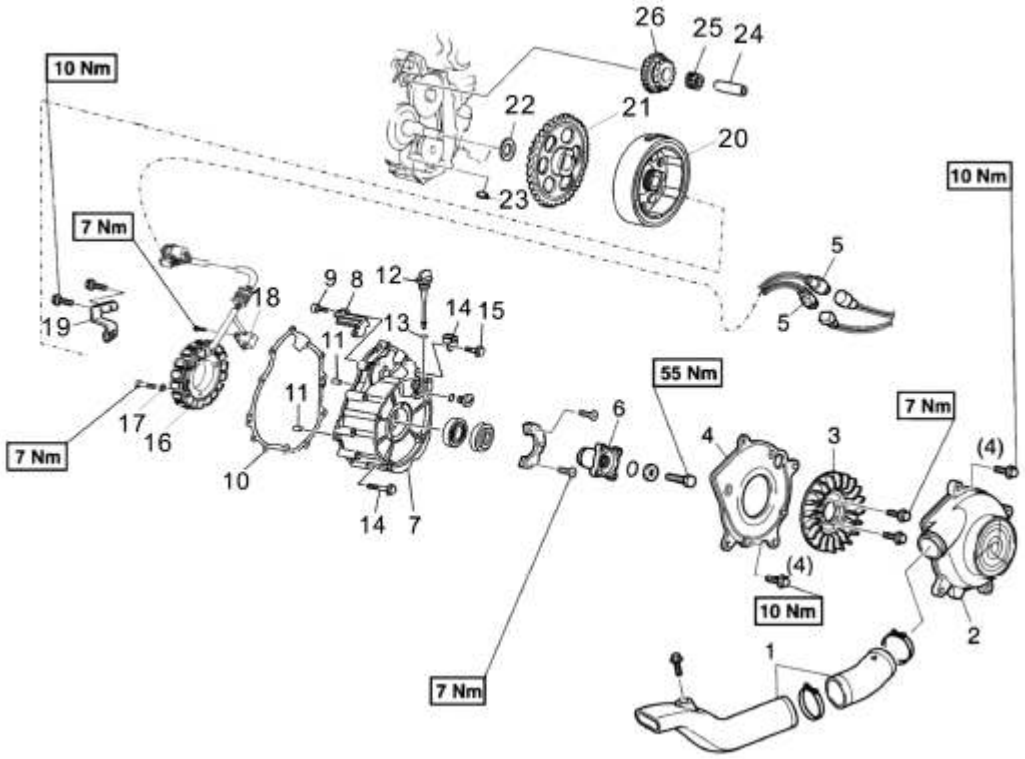


## Engine Cooling Fan and A.C. Magneto




| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| | **Removing the engine cooling fan and A.C. magneto** | | Remove the parts in the order listed. |
| | Drive belt cover | | |
| | Engine oil | | |
| | Coolant | | |
| | Water pump assembly | | |
| 1 | Engine cooling fan air duct assembly | 1 | |
| 2 | Air shroud 1 | 1 | |
| 3 | Engine cooling fan | 1 | |
| 4 | Air shroud 2 | 1 | |
| 5 | A.C. Magneto coupler | 2 | |
| 6 | Engine cooling fan pulley base | 1 | |
| 7 | Left & Front cover | 1 | |
| 8 | Press wire plate | 1 | |
| 9 | Inner hex cylinder screw M5 X 12 | 2 | |
| 10 | Seal cushion, left & front | 1 | |
| 11 | Cotter Pin 10 X 15.7 | 2 | |
| 12 | Gauge, oil level | 1 | |
| 13 | Seal O-ring 20 X 2.4 | 1 | |

## Engine Cooling Fan and A.C. Magneto



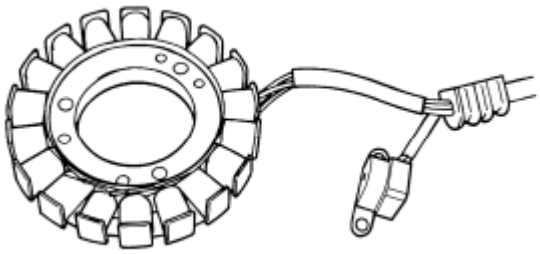

| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| 14 | Wire clip | | |
| 15 | Hex Flange bolt M6 X 30 | | |
| 16 | Generator stator | | |
| 17 | Washer B6 | | |
| 18 | Pickup coil | | |
| 19 | Stator lead holder | | |
| 20 | Generator rotor | | |
| 21 | Starter wheel gear | | |
| 22 | Washer | | |
| 23 | Woodruff key | | |
| 24 | Starter idle gear shaft | | |
| 25 | Bearing | | For installation, reverse the order listed. |
| 26 | Starter idle gear | | |

**Inspection**

A.C. Magneto

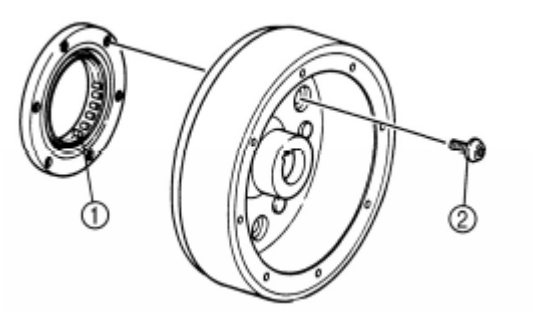
- Stator coil
- Pickup coil

Look for damage, signs of burnt discoloration or fraying wires.



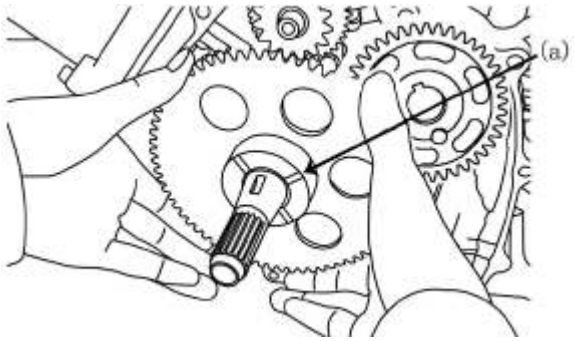
Starter Clutch (1)

Look for cracks or damage. Check the starter clutch bolts (2) for looseness. If any are loose, replace them with new ones and clinch the end of the bolt when installed.

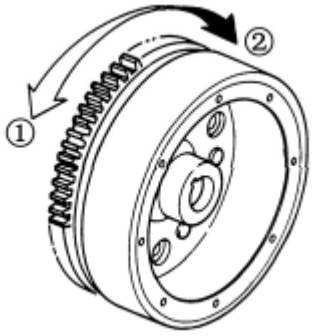



***Note:***
***The arrow mark on the starter clutch must face inward, away from the A.C. magneto rotor. When installing, apply the locking agent.***

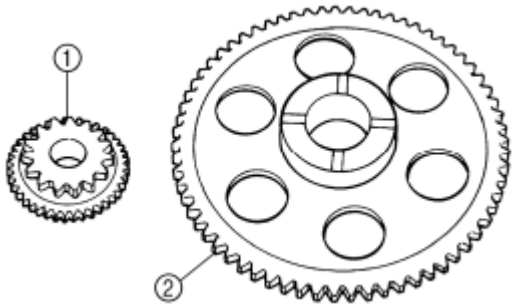
Install the starter wheel gear, (with the groove (a) facing the A.C. magneto rotor), onto the starter clutch, and hold the starter clutch.




Turn the starter wheel gear counterclockwise (1) to check that the starter clutch and wheel gear engage properly. If the starter clutch and wheel gear do not engage properly, replace the starter clutch. Turn the starter wheel gear clockwise (2) to check the starter wheel gear for smooth operation. If operation is not smooth, replace the starter clutch.



Inspect the starter idle gear teeth (1) and the starter wheel gear teeth (2) for damage, chips, roughness, pitting or wear.




Inspect the engine cooling fan

- Air shroud 1
- Air shroud 2

Look for cracks or damage.

**Installation**

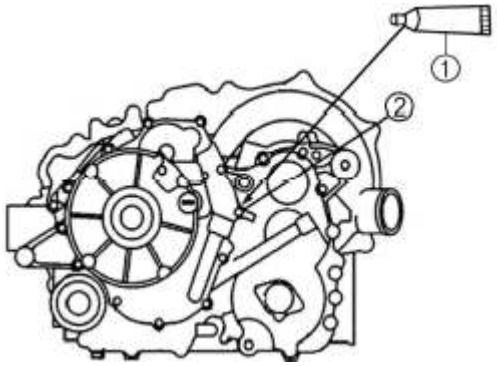
Install the woodruff key and the A.C. magneto rotor.

***Note:***
***Before installing the rotor, clean the Outside of the crankshaft and the inside of the rotor. After installing the rotor, check that the rotor rotates smoothly. If not, reinstall the key and rotor.***

Install the dowel pins a new gasket and the A.C. magneto cover.

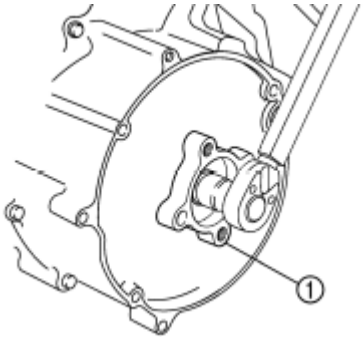
**10 Nm or 7 ft lbs**

***Note:***
**When installing the A.C. magneto cover, use a long rod to hold the A.C. magneto rotor in position from the outside. This will make assembly easier. Be careful not to damage the oil seal. Apply sealant (Quick Gasket) (1) to the thread of the bolt (2) shown in the illustration. Tighten the bolts in stages, using a crisscross pattern.**



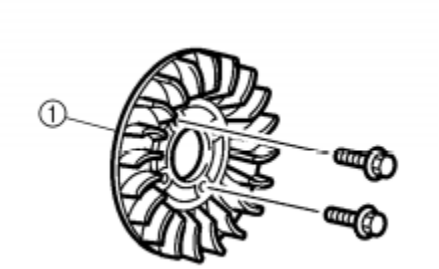

Install a new O-ring and the engine cooling fan pulley (1).

**55 Nm or 40 ft lbs.**



Install the engine cooling fan to the pulley.

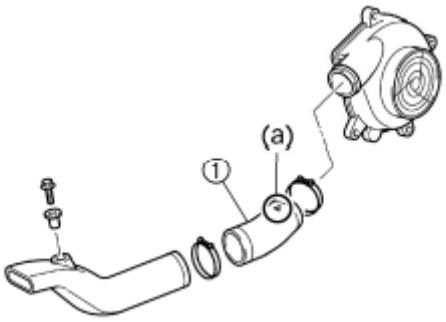
**7 Nm or 5 ft lbs**



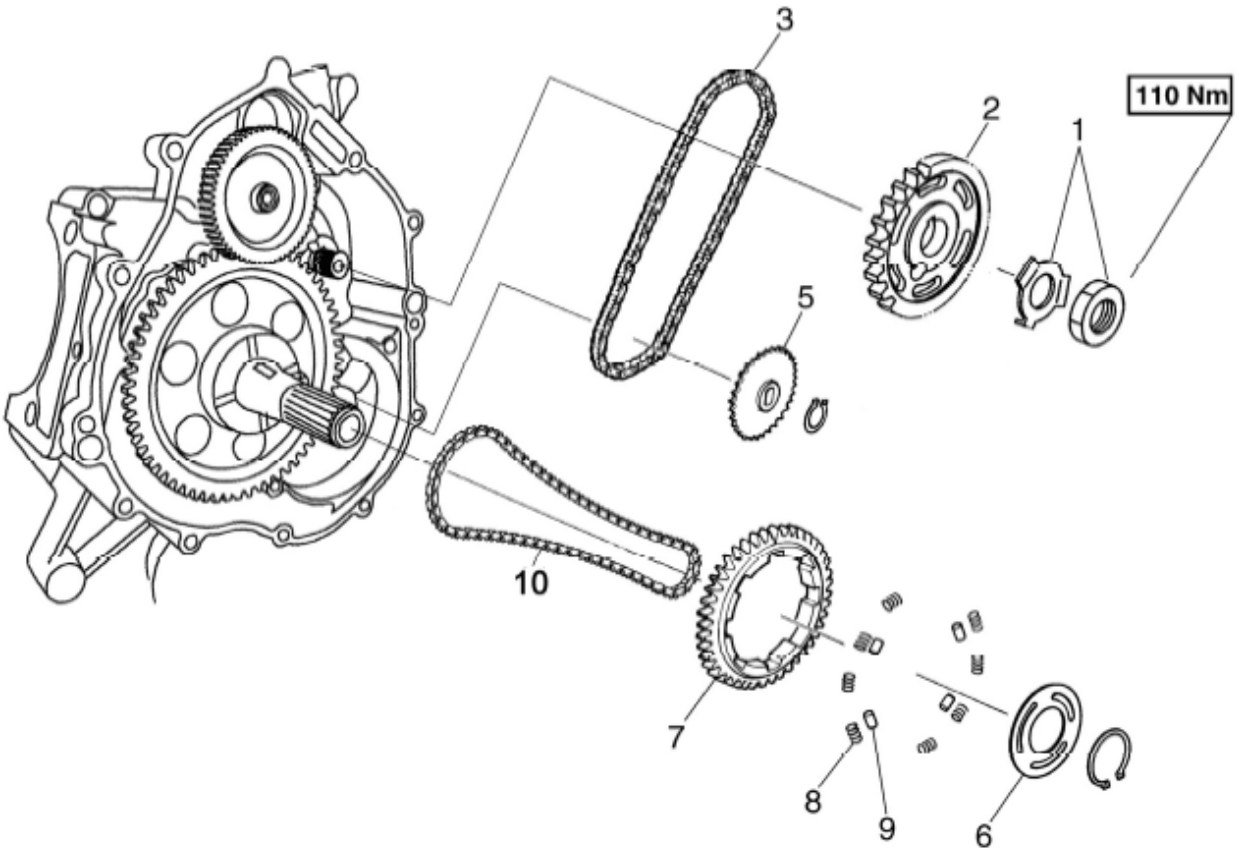

Install the air shroud.

**10 Nm or 7 ft lbs**

Install the engine cooling fan air duct assembly (1) with the arrow mark (a) towards the air shroud.



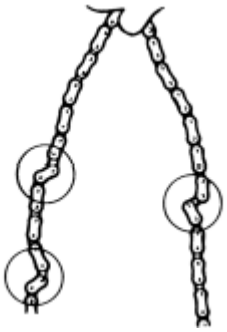
## Balancer Gears and Oil Pump Gears




| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| | **Removing the balancer gears and oil pump gears** | | Remove the parts in the order listed. |
| 1 | Nut/lock washer | 1/1 | |
| 2 | Balancer driven/oil pump drive gear | 1 | |
| 3 | Chain | 1 | |
| 4 | Straight key | 1 | |
| 5 | Oil pump driven gear | 1 | |
| 6 | Plate | 1 | |
| 7 | Balancer drive gear | 1 | |
| 8 | Spring | 8 | |
| 9 | Pin | 4 | For installation, reverse the order |
| 10 | Timing chain guide (intake side) | 1 | listed. |

**Inspection**

Inspect the Timing Chain. Look for cracks or stiffness. If replacement is necessary, replace the timing chain and the camshaft sprocket as a set.



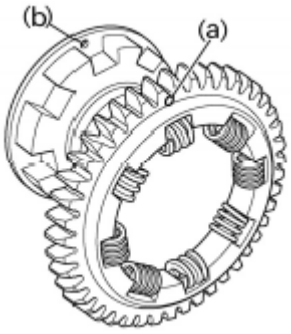
Inspect the timing chain guides for wear or damage.

**Installation**

Install

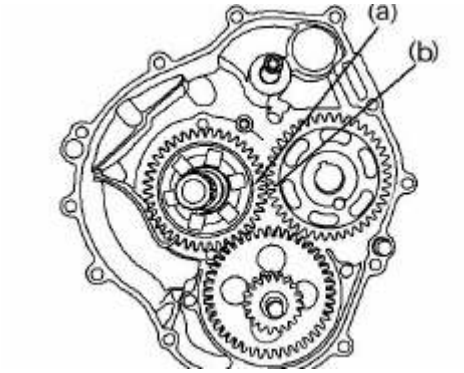
- Pins
- Springs
- Balancer drive gear (onto the buffer boss)
- Plate
- Circlip

***Note:***
**Align the punch mark (a) on the balancer drive gear with the hole (b) to the buffer boss.**




Install the balancer driven gear.

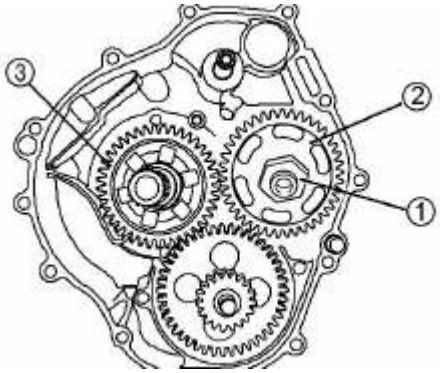
***Note:***
**Align the punch mark (a) on the balancer drive gear with the punch mark (b) on the balancer driven gear.**



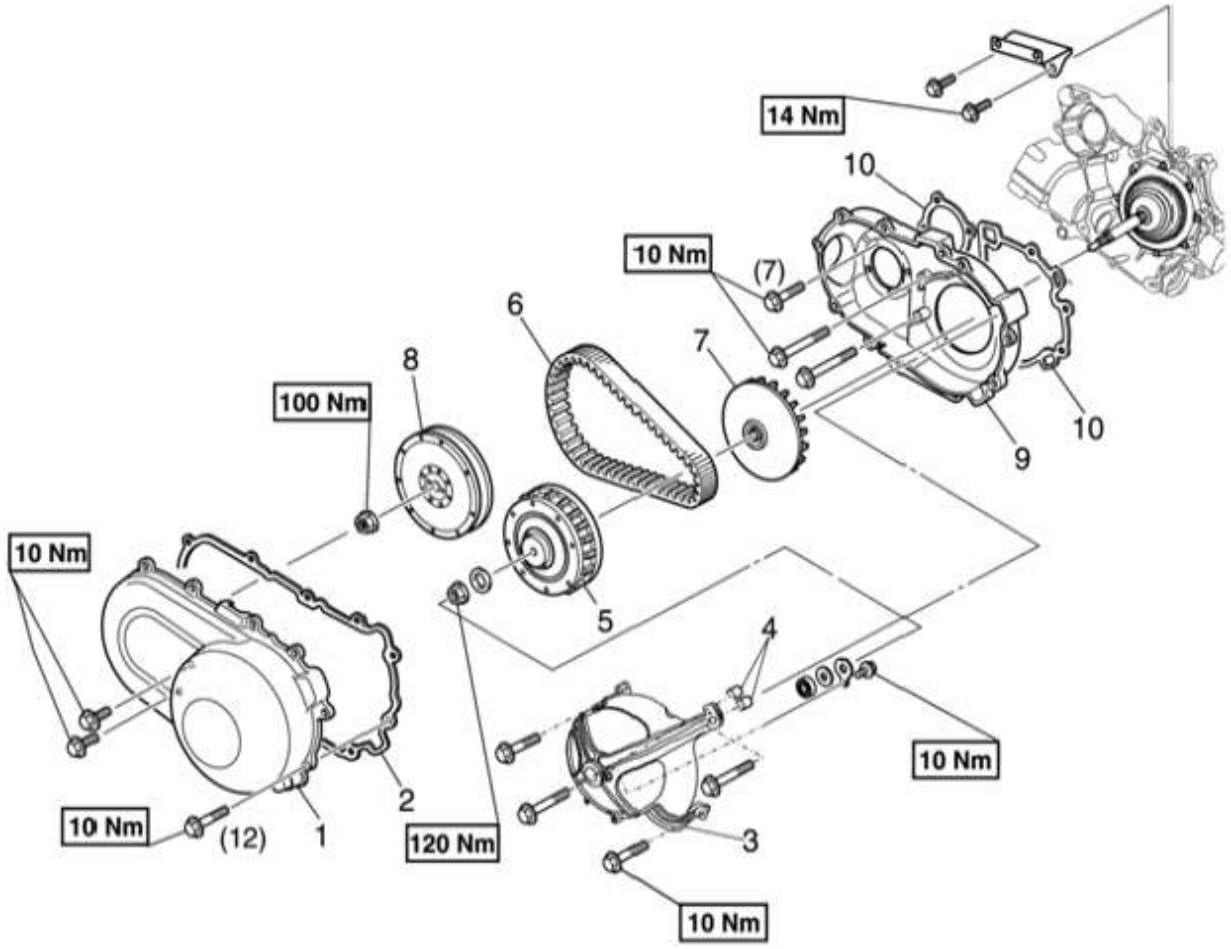

Install a new lock washer and the balancer gear nut (1).

**110 Nm or 80 ft lbs**

***Note:***
**The teeth of the balancer drive gear (3) and balancer driven gear (2). Apply the molybdenum disulfide grease to the thread of the axle and nut.**

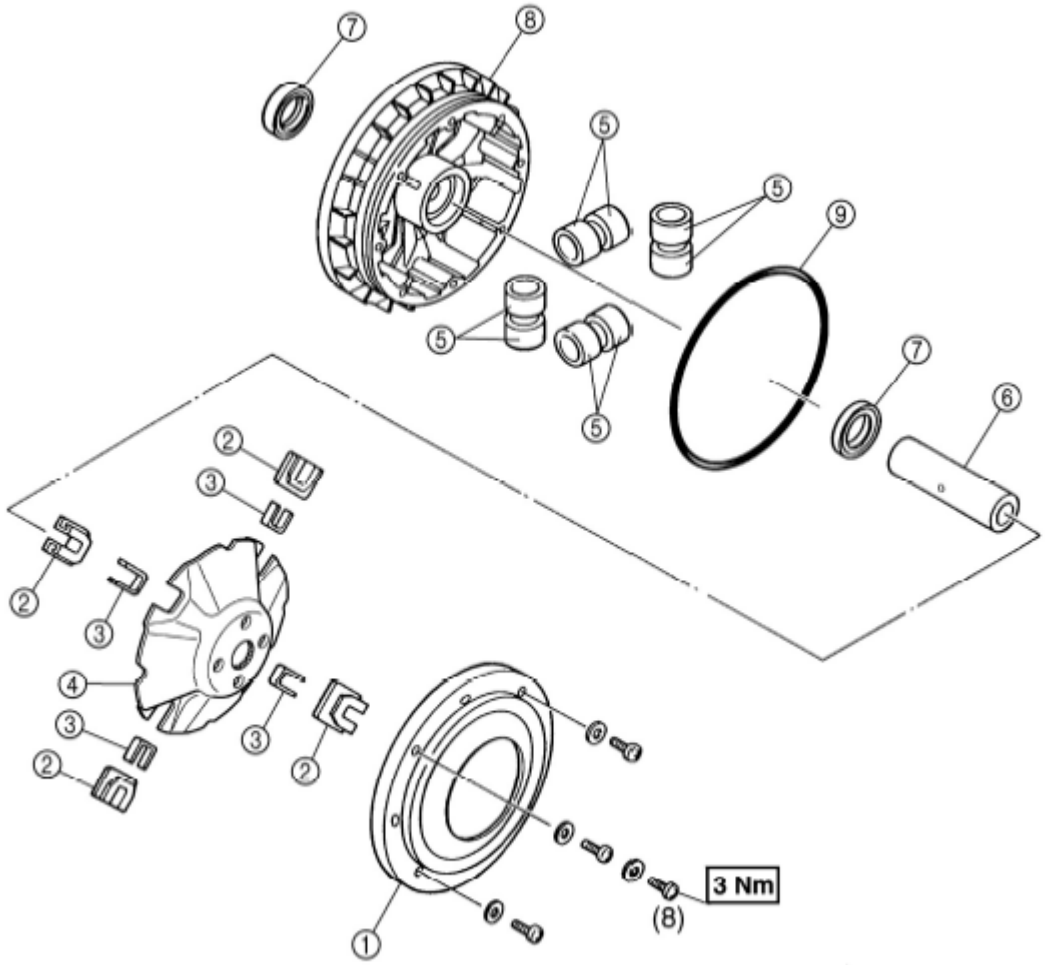


## Primary and Secondary Sheaves



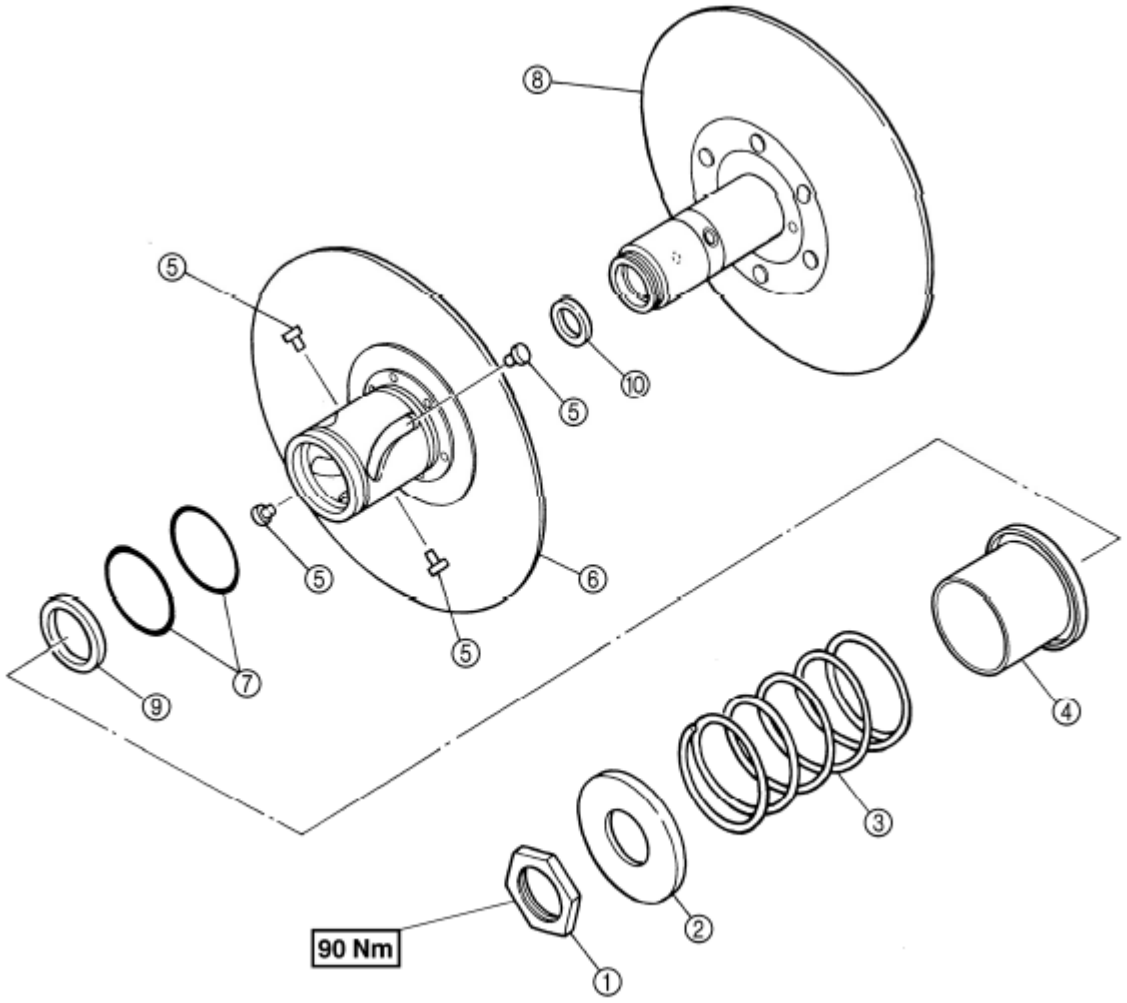

| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| | **Removing the primary and secondary sheaves** | | Remove the parts in the order listed. |
| | Engine assembly | | |
| 1 | Drive belt cover | 1 | |
| 2 | Rubber gasket | 1 | |
| 3 | Bearing housing | 1 | |
| 4 | Dowel pin | 2 | |
| 5 | Primary sheave assembly | 1 | |
| 6 | V-belt | 1 | |
| 7 | Primary fixed sheave | 1 | |
| 8 | Secondary sheave assembly | 1 | |
| 9 | Drive belt case | 1 | For installation, reverse the order |
| 10 | Rubber gasket | 2 | listed. |

## Primary Sheave




| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| | **Disassembling the primary sheave** | | Remove the parts in the order listed. |
| 1 | Primary pulley sheave cap | 1 | |
| 2 | Primary pulley slider | 4 | |
| 3 | Spacer | 4 | |
| 4 | Primary pulley cam | 1 | |
| 5 | Primary pulley weight | 8 | |
| 6 | Collar | 1 | |
| 7 | Oil seal | 2 | |
| 8 | Primary sliding sheave | 1 | For installation, reverse the order listed. |
| 9 | O-ring | 1 | |

## Secondary Sheave



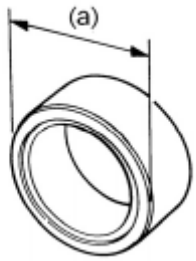

| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| | **Disassembling the secondary Sheave** | | Remove the parts in the order listed. |
| 1 | Nut | 1 | |
| 2 | Spring seat | 1 | |
| 3 | Compression spring | 1 | |
| 4 | Spring seat | 1 | |
| 5 | Guide pin | 4 | |
| 6 | Secondary sliding sheave | 1 | |
| 7 | O-ring | 2 | |
| 8 | Secondary fixed sheave | 1 | |
| 9 | Oil seal | 1 | For installation, reverse the |
| 10 | Oil seal | 1 | order listed. |

## Inspection

### Primary Sheave

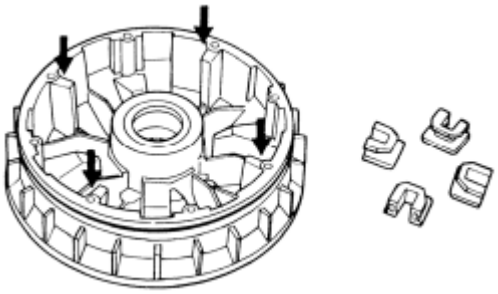
Measure the weights outside diameter.

**Service Wear Limit**
**29.5 mm**

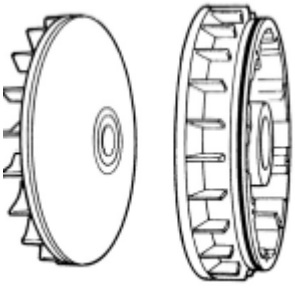



Inspect the primary pulley slider and the primary sliding sheave splines for wear, cracks or damage.

Inspect the spacers and primary pulley cam for cracks or damage.



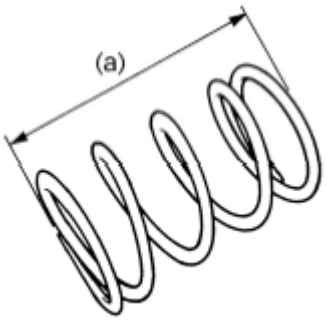
Inspect the primary sliding sheave and the primary fixed sheave for cracks, wear or damage.



### Secondary Sheave

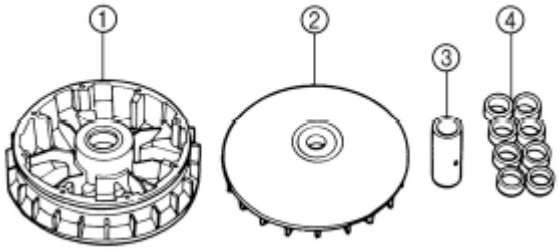
Inspect the torque cam grooves (1) and the guide pins (2) for wear or damage. Check for smooth operation.

Inspect the secondary sheave spring for damage or fatigue. Measure the secondary sheave spring free length (a).




## Installation

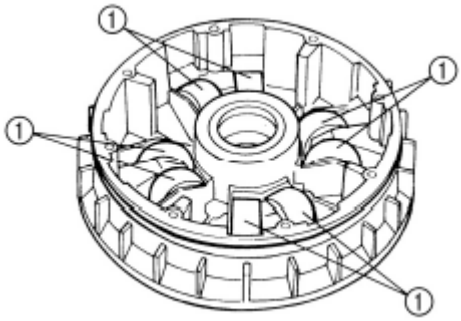
Remove any excess grease. Clean the primary sliding sheave face (1) and the primary fixed sheave face (2). Clean the collar (3) and the weights (4). Clean the primary sliding sheave cam face.



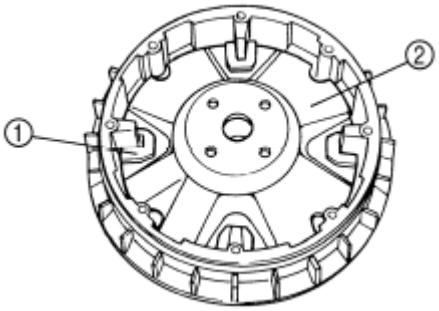
**Installation**

Install the weights (1).

***Note:***
**Apply grease (90g) to the whole outer surface of the weights and install. Apply grease to the inner surface of the collar. Apply grease to the inner surface of the primary sliding sheave.**

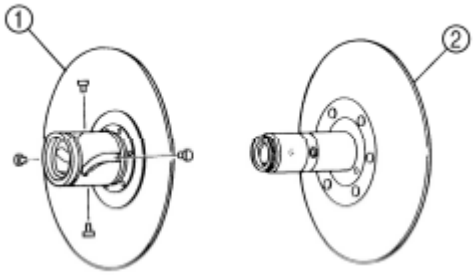



Install the spacer, sliders (1), primary pulley cam (2), and primary sliding sheave cap (3 Nm).

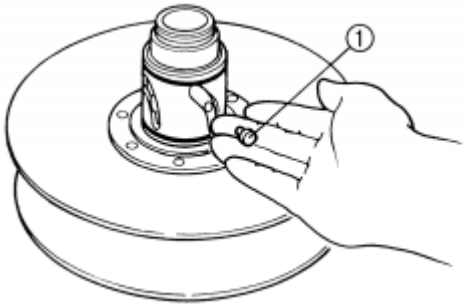



Assembling the secondary sheave

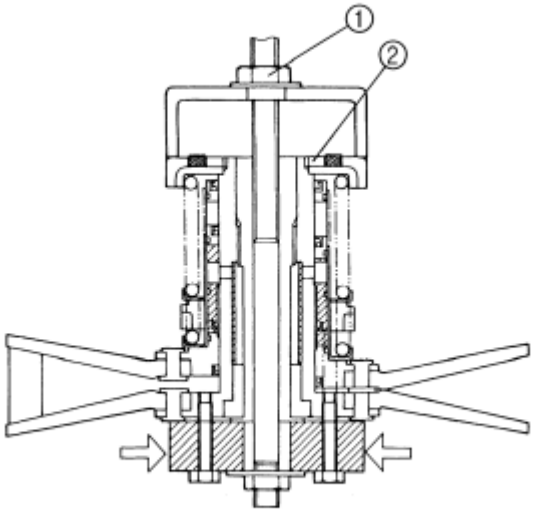
Apply assembly lube to the secondary sliding sheave inner surface (1) and the bearings, oil seals and inner surface of the secondary fixed sheave (2).




Install the guide pins (1), spring seat, compression spring, spring seat and nut.

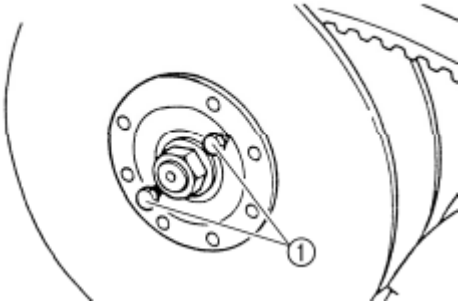


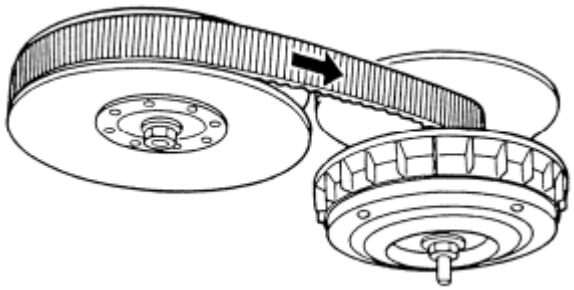

- Attach the sheave fixed block, locknut wrench and sheave spring compressor to the secondary sheave assembly.
- Place the sheave fixed block in a vise and secure it.
- Tighten the sheave spring compressor nut (1) and compress the spring.
- Install the nut (2) and tighten it to the specified torque using the locknut wrench.(Nut:90Nm)
- Remove the sheave spring compressor, locknut wrench, and sheave fixed block.




Install the secondary sheave assembly, V-belt and primary sheave assembly.

***Note:***
**Tightening the bolts (1) will push the secondary sliding sheave away, causing the gap between the secondary fixed and sliding sheaves to widen.**



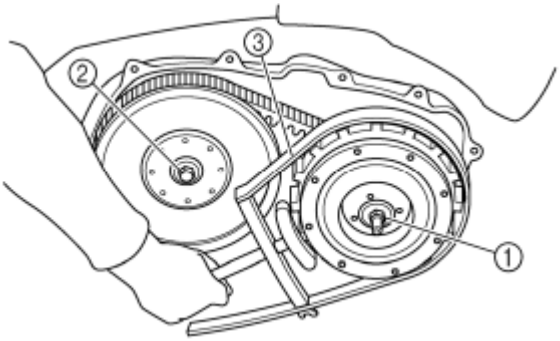
Tighten the primary sheave nut (1).

**120 Nm or 85 ft lbs**

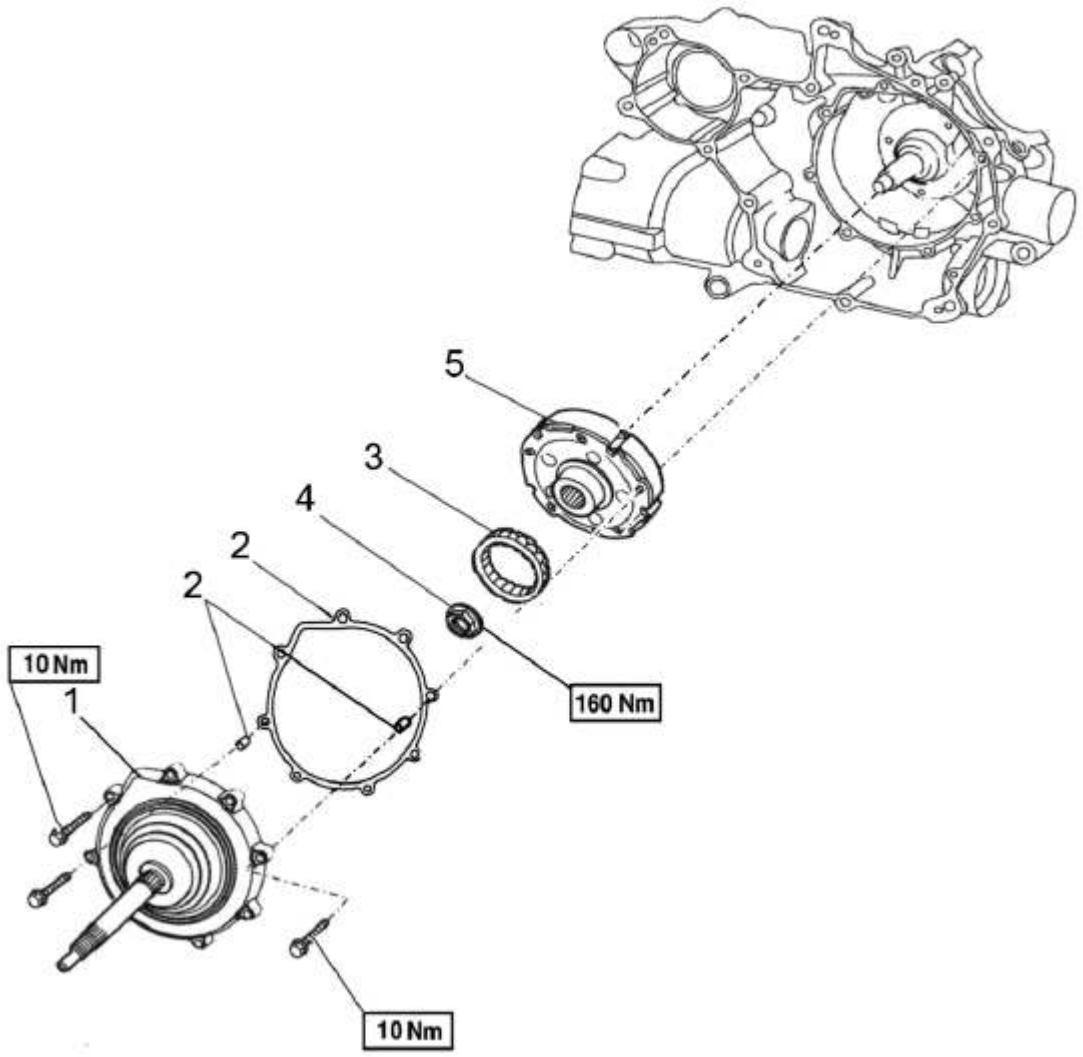
Tighten the secondary sheave nut (2).

**100 Nm or 72 ft lbs**

***Note:***
***Use the sheave holder (3) to hold the primary sheave. First, tighten the primary sheave nut (1), then tighten the secondary sheave nut (2).***

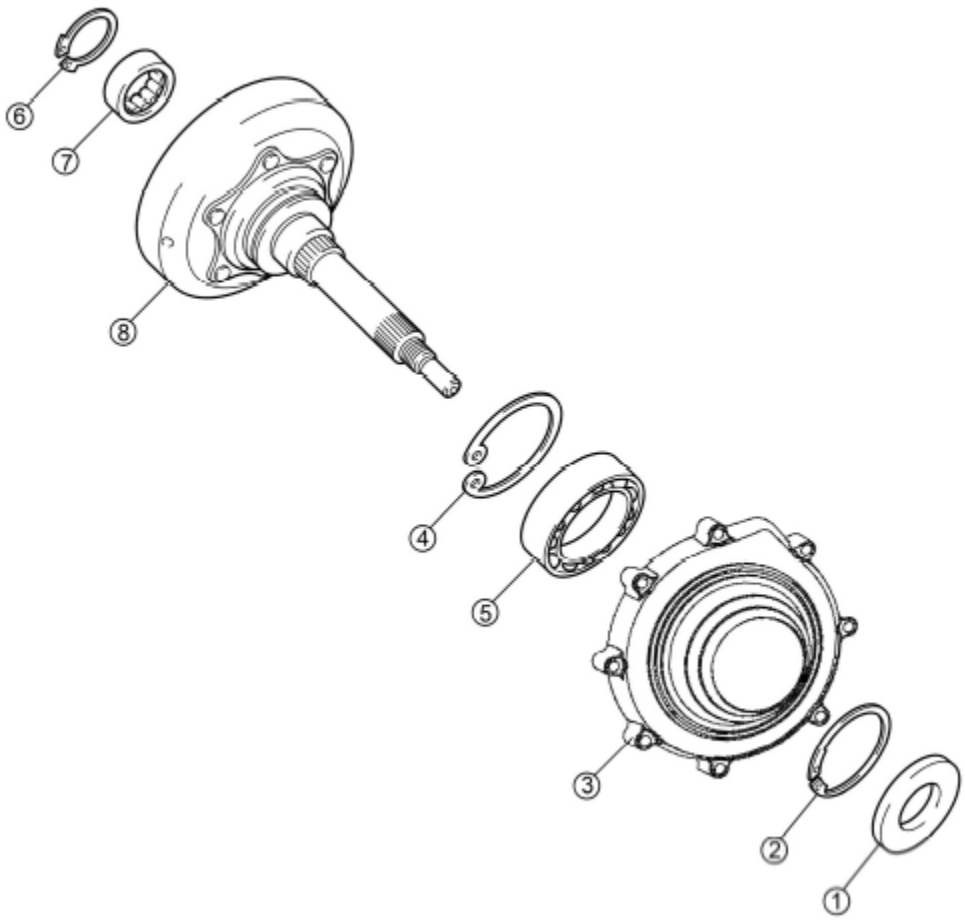


## Clutch




| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| | **Removing the clutch** | | Remove the parts in the order listed. |
| | Primary and secondary sheaves | | |
| 1 | Clutch housing assembly | 1 | |
| 2 | Gasket/dowel pin | ½ | |
| 3 | One-way clutch bearing | 1 | |
| 4 | Nut | 1 | For installation, reverse the |
| 5 | Clutch carrier assembly | 1 | order listed. |

## Clutch Housing Assembly

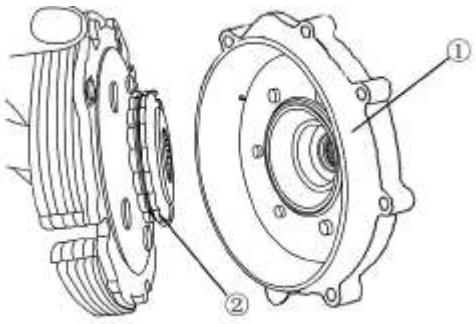



| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| | **Disassembling the clutch housing** | | Remove the parts in the order listed. |
| 1 | Oil seal | 1 | |
| 2 | Circlip | 1 | |
| 3 | Bearing Housing | 1 | |
| 4 | Circlip | 1 | |
| 5 | Bearing | 1 | |
| 6 | Circlip | 1 | |
| 7 | Bearing | 1 | For installation, reverse the order listed. |
| 8 | Clutch Housing | 1 | |

**Inspection**

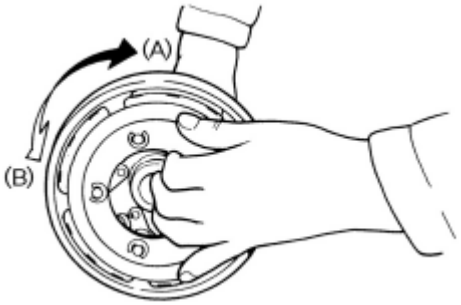
Inspect the clutch housing (1) for heat damage, wear or grooves.

Inspect the one way clutch bearing (2) for chafing, wear or damage.




***Note:***
**Replace the one-way clutch assembly and clutch housing as a set. The one-way clutch bearing must be installed with the flange side facing in.**

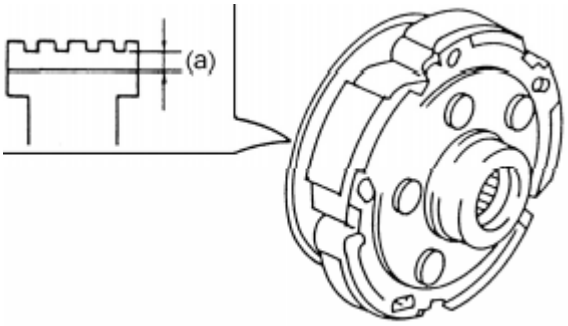
- Install the one-way clutch bearing and clutch carrier assembly to the clutch housing and hold the clutch carrier assembly.
- When turning the clutch housing clockwise (A), the clutch housing should turn freely. If not, the one-way clutch assembly is faulty.
- When turning the clutch housing counterclockwise (B), the clutch housing and crankshaft should be engaged If not, the one-way clutch assembly is faulty.




Inspect the clutch shoe for heat damage.

Measure the clutch shoe thickness.

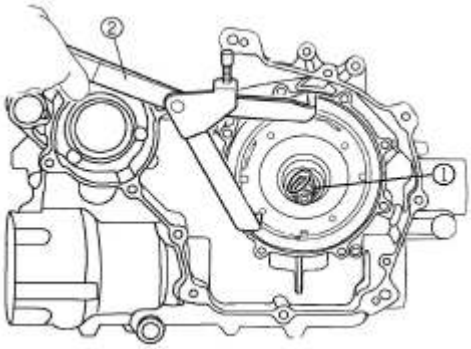
**Service Wear Limit**
**(a) 1.0 mm**




**Installation**

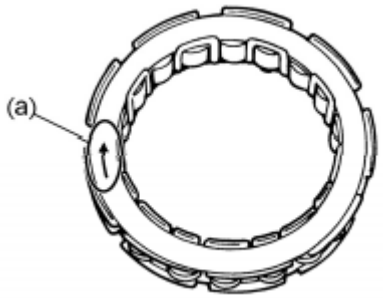
Use the universal clutch holder(2) to hold the clutch carrier assembly and install the nut (1).

**160 Nm or 115 ft lbs**




Lock the threads with a drift punch.

***Note:***
**The one-way clutch bearing should be installed in the clutch carrier assembly with the arrow mark (a) facing toward the clutch housing.**

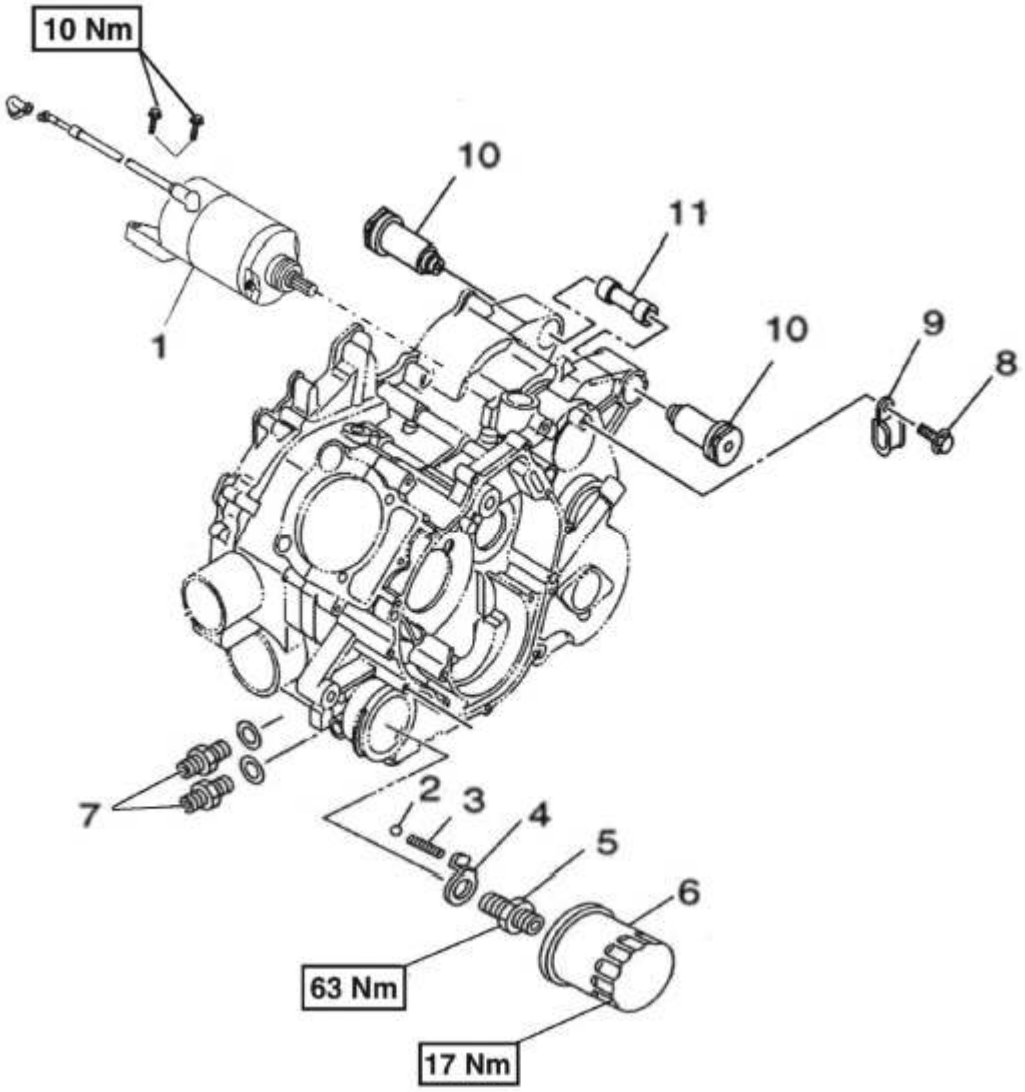



Install the dowel pins, gasket and clutch housing assembly.

**10 Nm or 7 ft lbs**

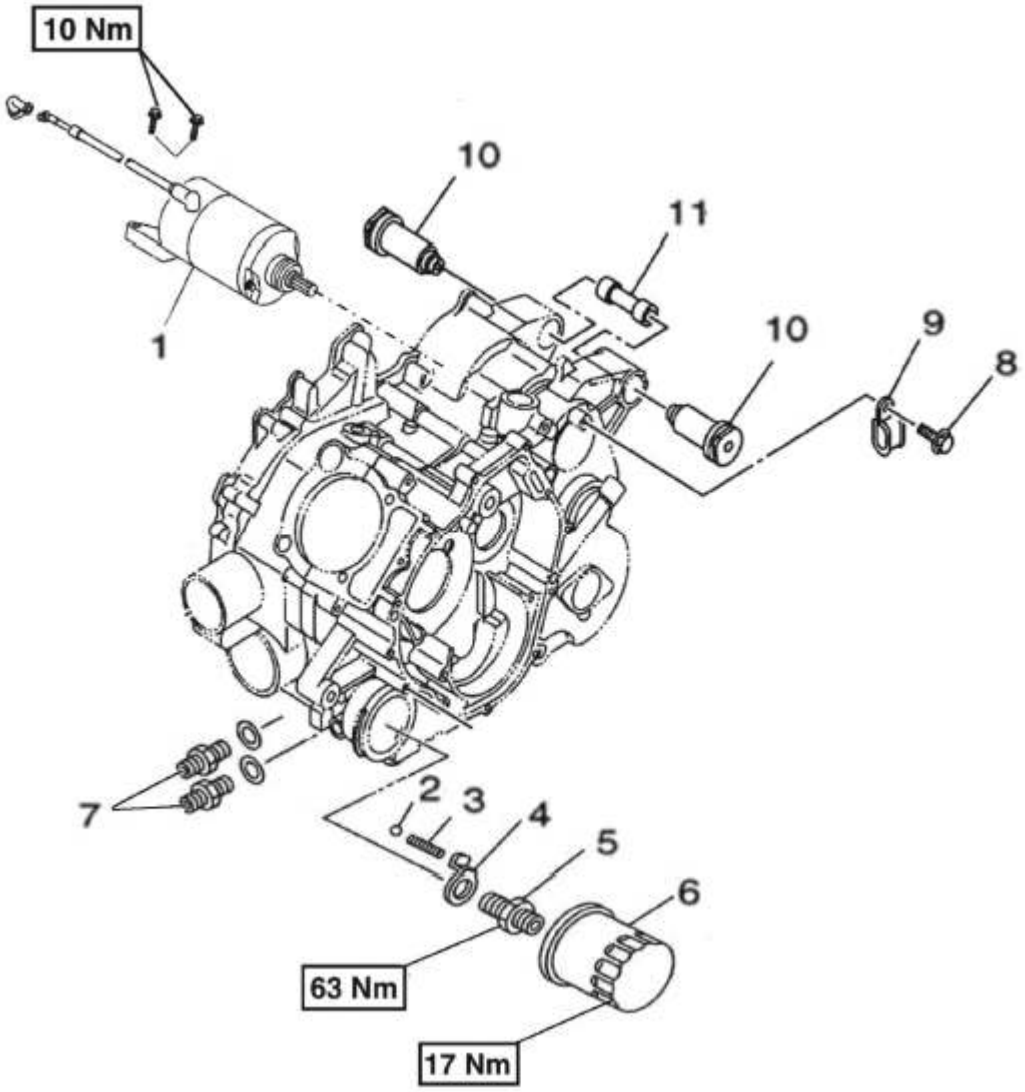
***Note:***
***Tighten the bolts in stages, using a crisscross pattern. After tightening the bolts, check that the clutch housing assembly rotates counterclockwise smoothly.***

## Crankcase, Starter Motor and Oil Filter



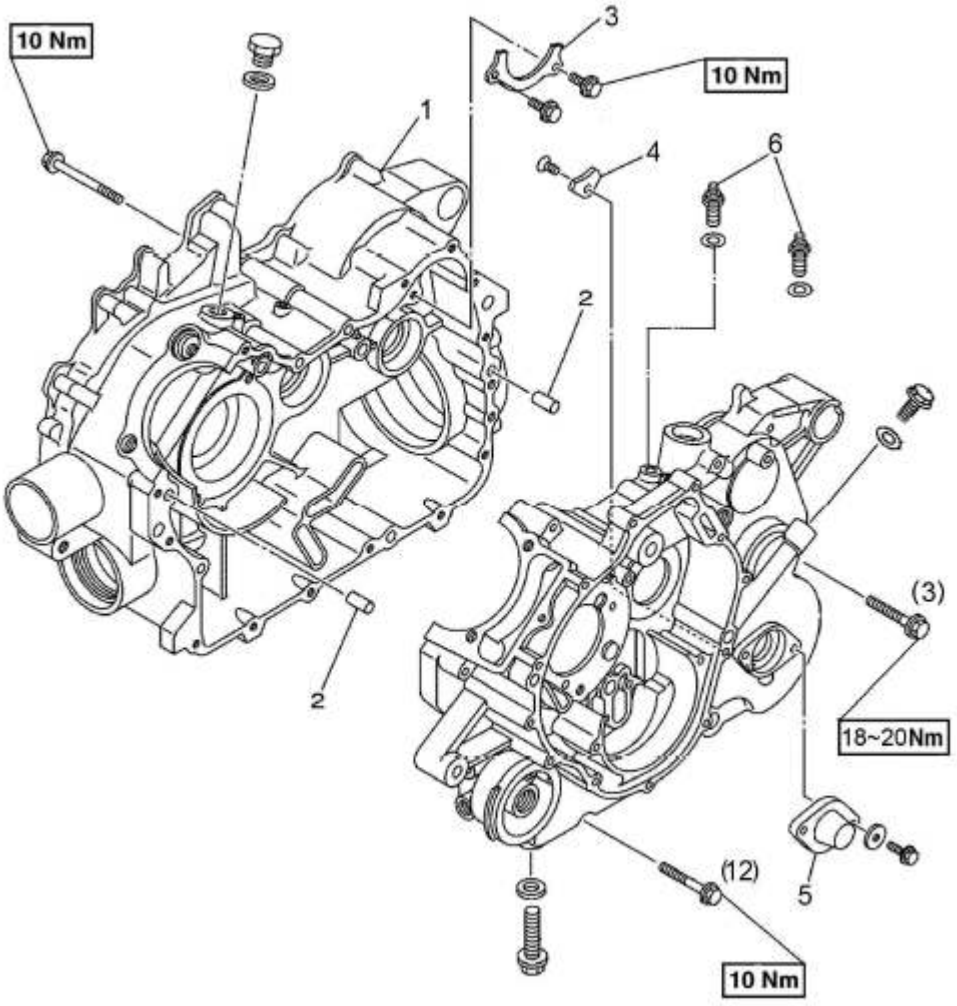

| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| | **Remove the starter motor, and oil filter** | | Remove the parts in the order listed |
| | A.C magneto rotor | | |
| | Primary and secondary sheaves | | |
| | Clutch carrier assembly | | |
| 1 | Starter motor | 1 | |
| 2 | Check Ball SR8 | 1 | |
| 3 | Spring | 1 | |
| 4 | Pressure plate | 1 | |
| 5 | Filter mount | 1 | |
| 6 | Oil Filter | 1 | |
| 7 | Bolt M14 X 16 | 2 | |

## Crankcase, Starter Motor and Oil Filter



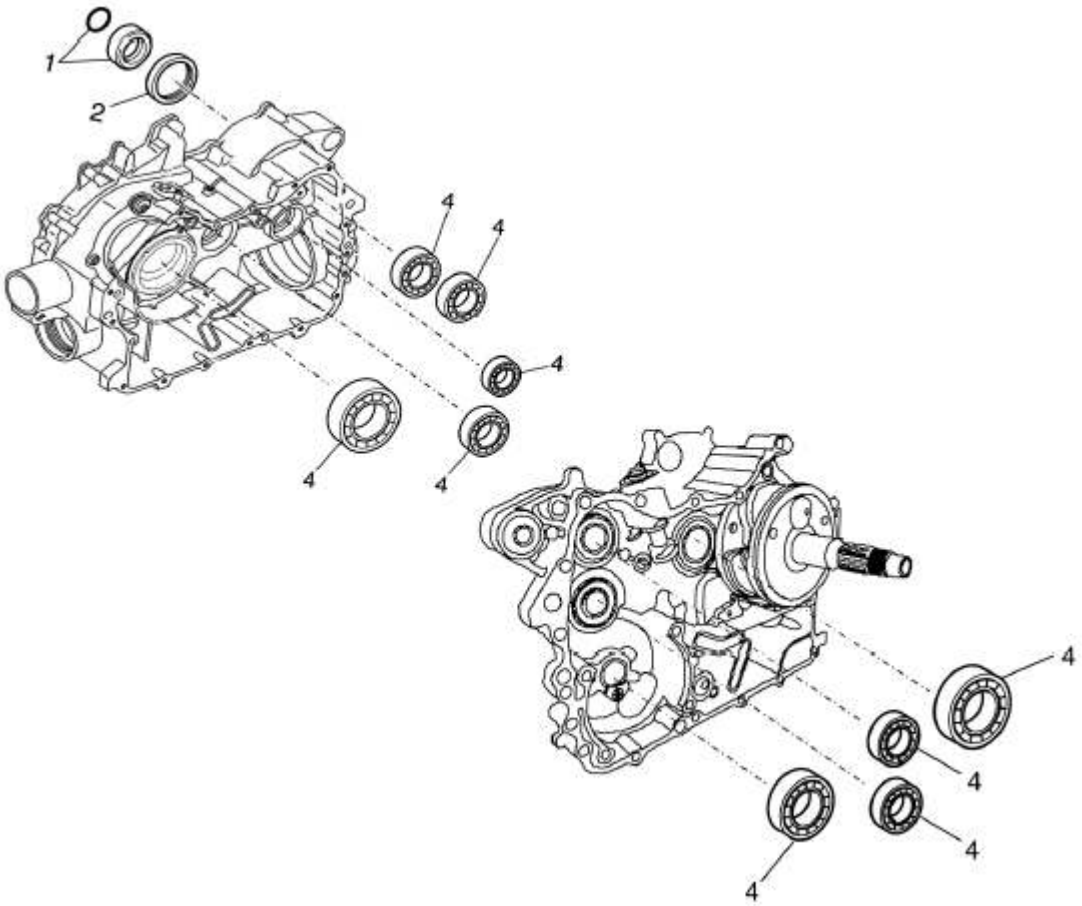

| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| 8 | Hex flange bolt M6×20 | 1 | |
| 9 | Cable shield | 1 | |
| 10 | Shock absorber sheath, suspension | 2 | For installation, reverse the |
| 11 | Suspension collar sheath | 2 | order listed. |

## Crankcase




| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| | **Separating the crankcase** | | Remove the parts in the order listed. |
| 1 | Left crankcase | 1 | |
| 2 | Dowel pin | 1 | |
| 3 | Press plate,bearing | 1 | |
| 4 | Press plate,bearing | 1 | |
| 5 | Fuel seal MV036A1 | 1 | For installation, reverse the |
| 6 | Gear switch | 1 | order listed. |

## Crankcase bearings




| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| | **Removing the crankcase bearings** | | Remove the parts in the order listed. |
| | Crankshaft and oil pump<br>Transmission<br>Middle drive/driven shaft | | |
| 1 | O-ring/collar | 1/1 | |
| 2 | Oil seal | 1 | |
| 3 | Bearing retainer | 1 | For installation, reverse the order listed. |
| 4 | Bearing | 9 | |

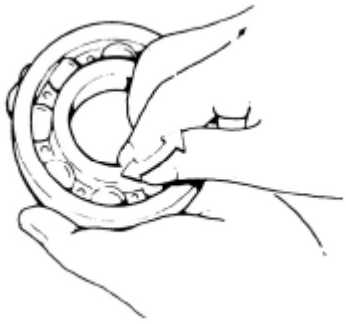
**Inspection**

Thoroughly wash the case halves in a mild solvent.

Clean all the gasket mating surfaces and crankcase mating surfaces thoroughly.

Inspect the crankcase for any cracks or damage and blow out with compressed air all oil delivery passageways.

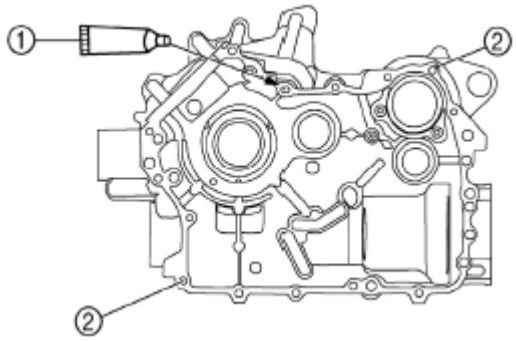
Inspect the bearings, clean and lubricate the bearing then rotate the inner race with a finger. Look for roughness.



Assembling the crankcase.

Apply sealant (1) (Quick gasket) to the mating surfaces of both crankcase halves.

Install the dowel pins (2) and fit the left crankcase half onto the right crankcase half. Tap lightly on the case with a soft hammer.




***Caution:***

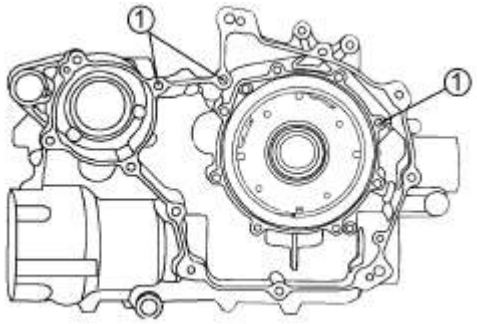
**Before tightening the crankcase holding bolts, be sure to check whether the transmission is functioning properly by manually rotating the shift drum in both directions.**

Tighten:

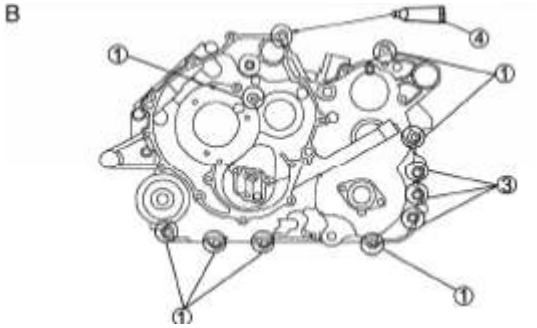
- crankcase bolts (1), (2) (10Nm) (follow the proper tightening sequence)
- crankcase bolts (3) (26Nm)(follow the proper tightening sequence)

A Left crankcase

A



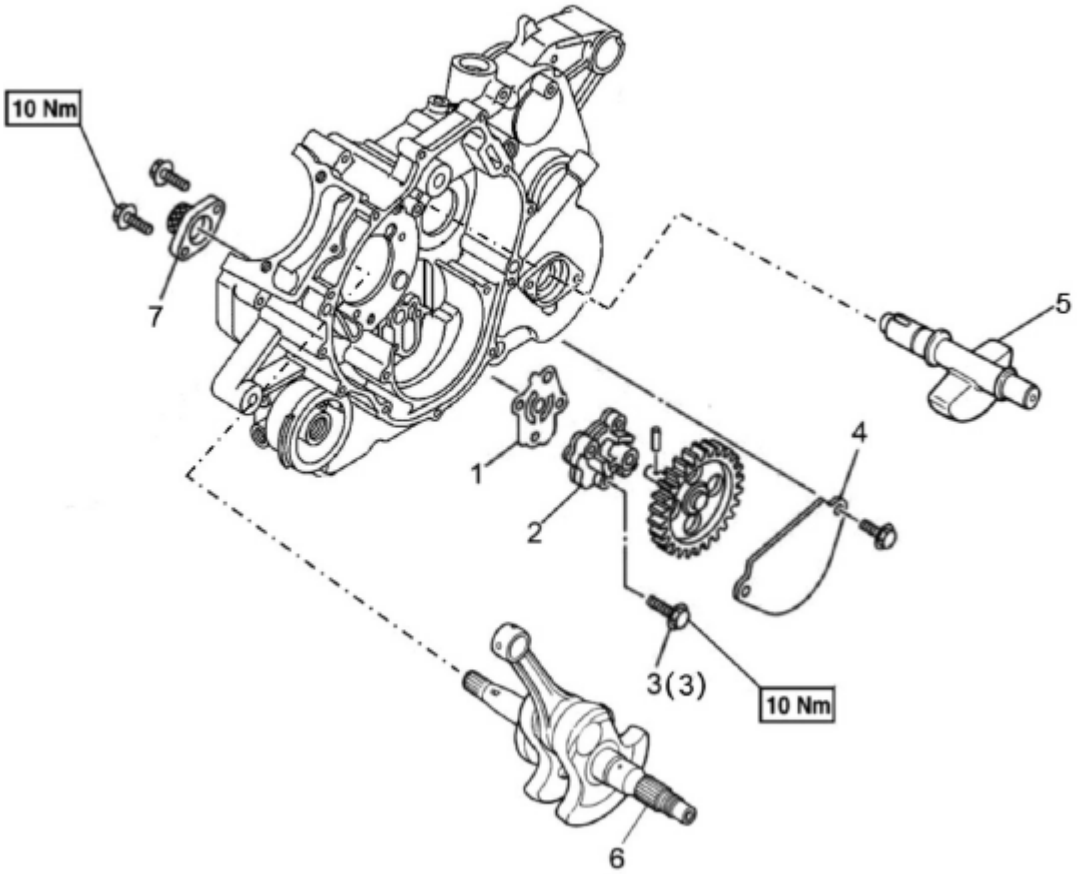
B Right crankcase




***Note:***
**Tighten the bolts in stages, using a crisscross pattern. Apply sealant (Quick Gasket) (4) to the thread of the bolt (2) shown in the illustration.**

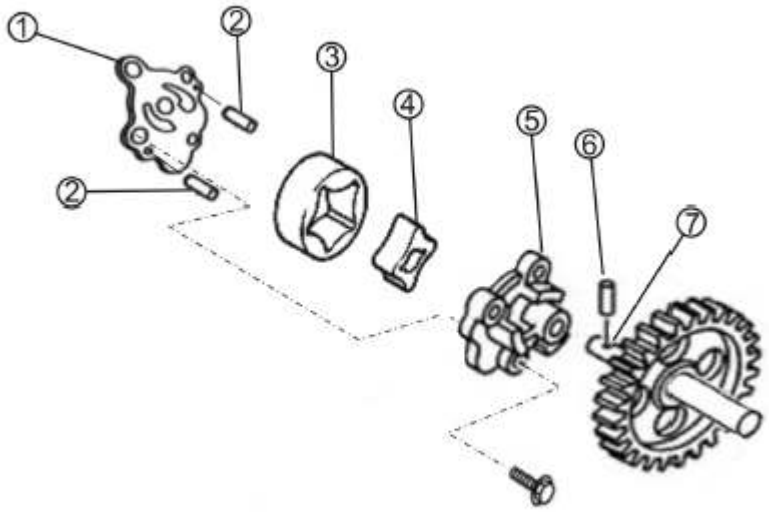
Apply 4-stroke engine oil (to the crank pin, bearing and oil delivery hole).

## Crankshaft and Oil Pump




| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| | **Removing the crankshaft and oil pump** | | Remove the parts in the order listed. |
| | Crankcase separation | | |
| 1 | Oil Pump Gasket | 1 | |
| 2 | Oil pump assembly | 1 | |
| 3 | Hex flange bolt M6×25 | 1 | |
| 4 | Cover, oil pump | 1 | |
| 5 | Balancer | 1 | For installation, reverse the |
| 6 | Crankshaft | 1 | order listed. |

## Oil Pump




| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| | **Disassembling the oil pump** | | Remove the parts in the order listed. |
| 1 | Oil pump housing | 1 | |
| 2 | Pin | 2 | |
| 3 | Outer rotor | 1 | |
| 4 | Inner rotor | 1 | |
| 5 | Rotor cover | 1 | |
| 6 | Pin | 1 | For installation, reverse the order listed. |
| 7 | Shaft | 1 | |

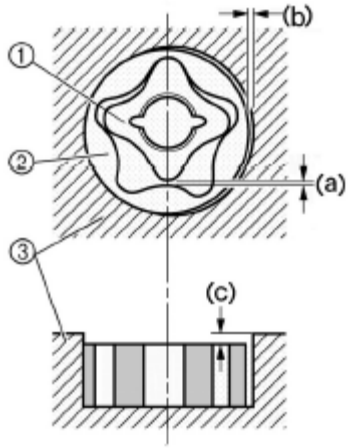
**Inspection**

Inspect the oil pump rotor housing and rotor cover for cracks wear or damage.

Inspect and clean the oil strainer. Look for damage and contaminants.

Measure the oil pump.

- tip clearance(a)
  (between the inner rotor (1) and the out rotor (2))
- side clearance(b)
  (between the outer rotor (2) and the pump housing (3))
- body clearance (c)
  (between the outer rotor (2) and the pump housing (3))




**Tip clearance Limit: 0.23 mm**
**Side clearance Limit: 0.17 mm**
**Body clearance Limit: 0.24 mm**

Measure the crankshaft width (A).

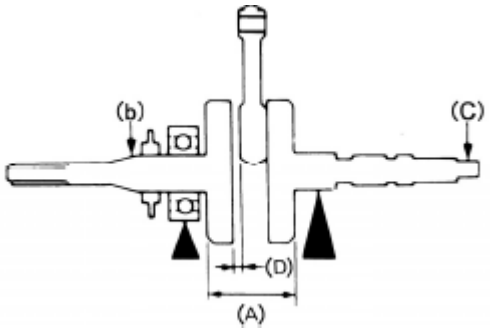
**Crank width**
**58.9 ~ 59.1mm**

Measure the side clearance (D).

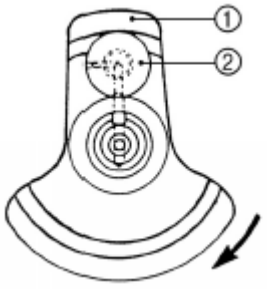
**Big end side clearance**
**Limit: 0.45~0.8mm**

Measure the runout (b) (C).

**Runout limit**
**(b): 0.03 mm (C): 0.03 mm**




The crankshaft (1) and the crank pin (2) oil passages must be properly interconnected with a tolerance of less than 1 mm (0.04 in).




***<u>Caution:</u>***
***The buffer boss and woodruff key must be replaced when removed from the crankshaft.***

**Installation**

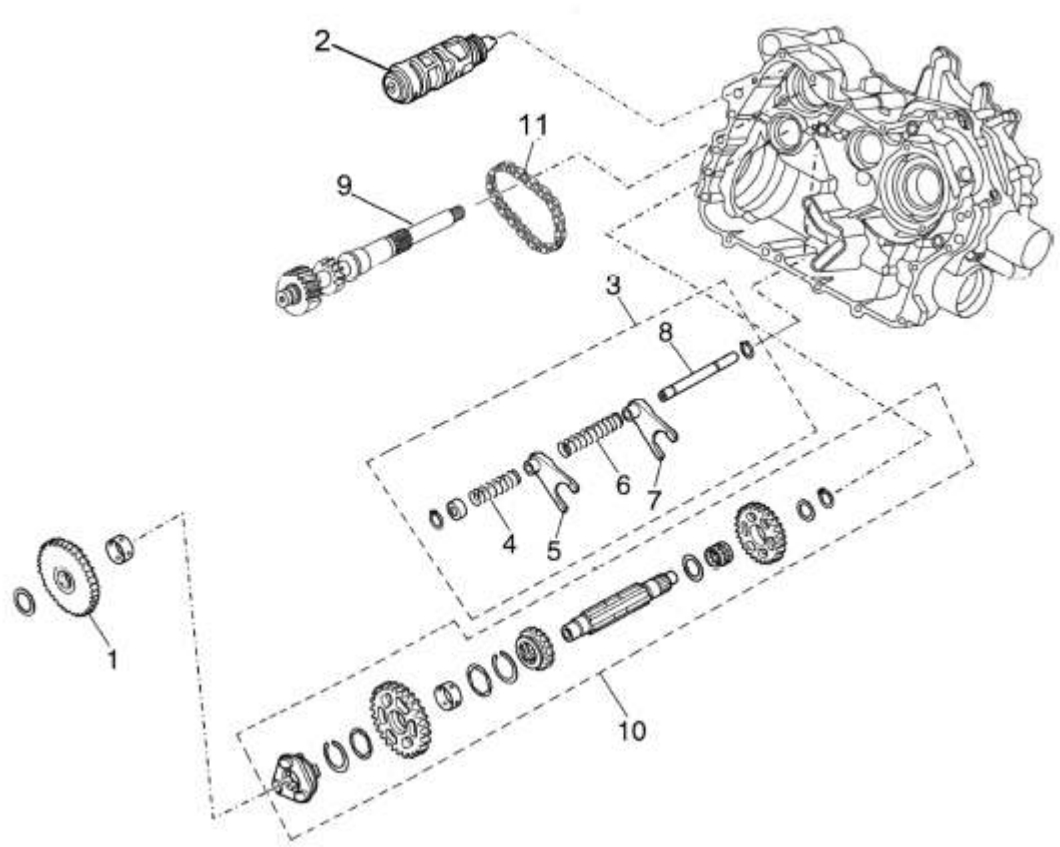
Assemble the oil pump with the recommended lubricant.

- inner rotor
- outer rotor
- oil pump shaft

Install the crankshaft and balancer.

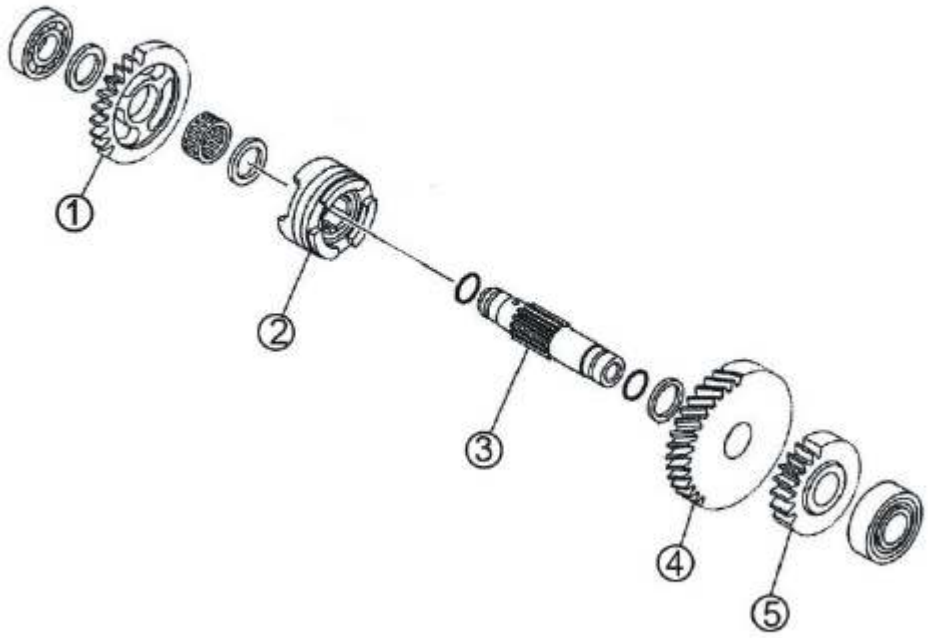
***Note:***
***Hold the connecting rod at the Top Dead Center (TDC) with one hand while turning the nut of the installation tool with the other. Operate the installation tool until the crankshaft bottoms against the bearing.***

## Transmission




| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| | **Removing the transmission** | | Remove the parts in the order listed. |
| | Crankcase separation | | |
| | Middle driven gear | | |
| 1 | Low wheel gear | 1 | |
| 2 | Shift drum | 1 | |
| 3 | Shift fork assembly | 1 | |
| 4 | Short spring | 1 | |
| 5 | Shift fork 1 | 1 | |
| 6 | Long spring | 1 | |
| 7 | Shift fork 2 | 1 | |
| 8 | Guide bar | 1 | |
| 9 | Secondary shaft | 1 | |
| 10 | Drive axle assembly | 1 | For installation, reverse the order listed. |
| 11 | Chain | 1 | |

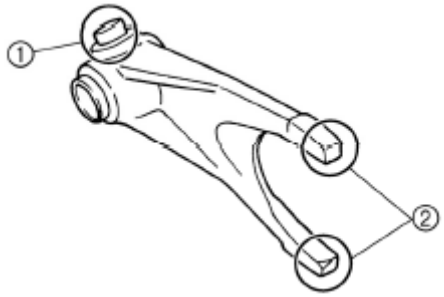
## Drive Axle Assembly



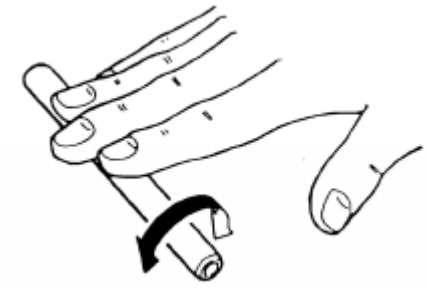

| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| | **Disassembling the drive axle** | | Remove the parts in the order listed. |
| 1 | Driven gear , gear R | 1 | |
| 2 | DR adapter sleeve | 1 | |
| 3 | Intermediate axle | 1 | |
| 4 | Driven gear , gear D | 1 | For installation, reverse the |
| 5 | Bush 26x42x14.7 | 1 | order listed. |

**Inspection**

Inspect the shift fork follower (1) and the shift fork pawl (2). Look for scoring, bends, wear or damage.

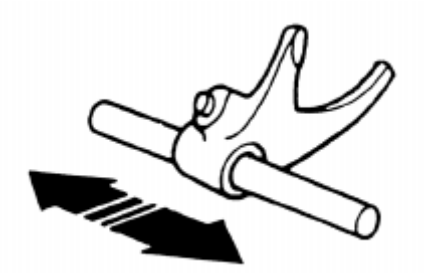



Inspect the guide bar for bends.

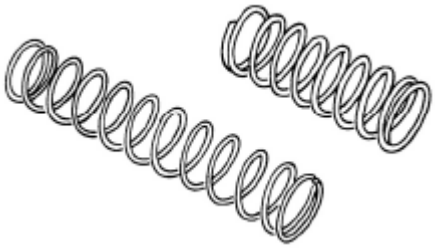


***<u>Warning:</u>***
***Do not attempt to straighten a bent guide bar.***

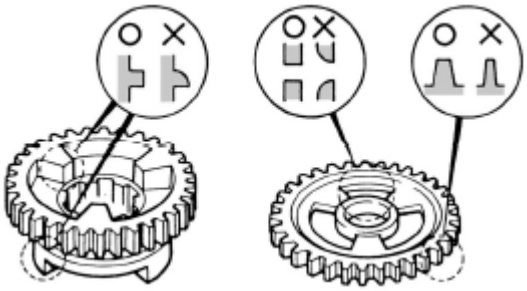
Check the movement of the shift fork on the guide bar. It should slide smoothly.



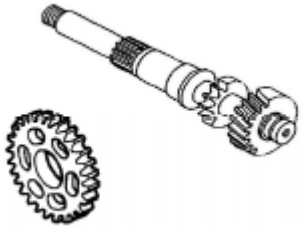
Inspect the springs for cracks or damage.



Inspect the dog and slot engagement. Look for wear or damage.



Inspect the high wheel gear and middle drive gear teeth. Look for discoloration, pitting or wear. Check the dogs or slots for rounded edges, cracks or damage. Check the gear movement on the shaft. It should move smoothly.

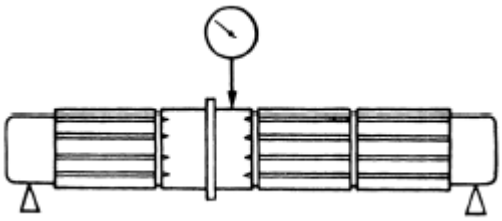


Replace the circlip with a new one.

Inspect the secondary shaft and driven sprocket. Look at the gear teeth for discoloration, pitting or wear. Check the gear movement on the shaft. It should move smoothly. Replace the circlip with a new one.

Inspect the chain for cracks of stiffness. If replacement is necessary replace the chain, secondary shaft and driven sprocket as a set.

Measure the shaft runout with v blocks and a dial gauge.

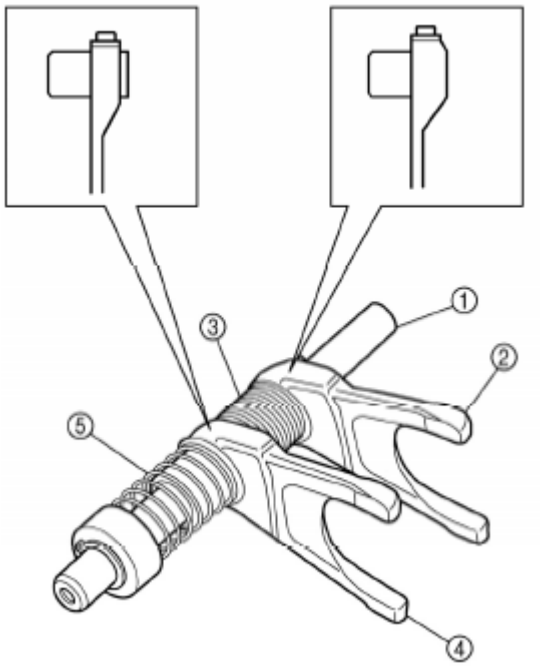


**Shaft runout limit**
**0.06 mm**

**Installation**

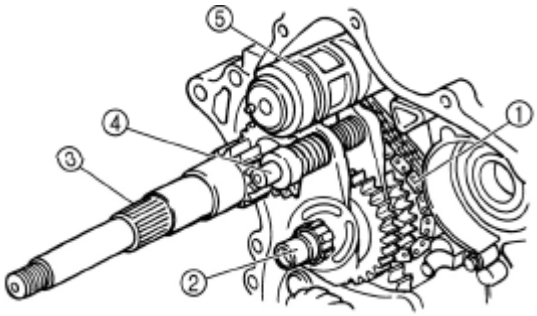
Assemble the shift shaft.

- Guide Bar (1)
- Shift fork 2 (2)
- Long spring (3)
- Shift fork 1 (4)
- Short spring



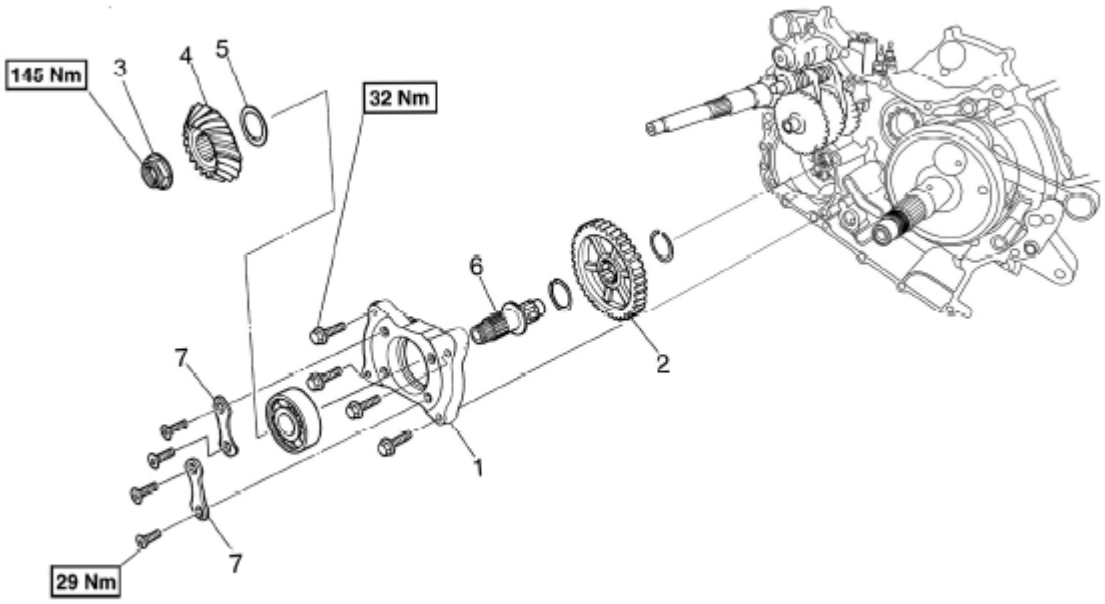

Install the transmission.

- Chain (1)
- Drive axle assembly (2)
- Secondary shaft (3)
- Shift fork assembly (4)
- Shift drum (5)
- Low wheel gear



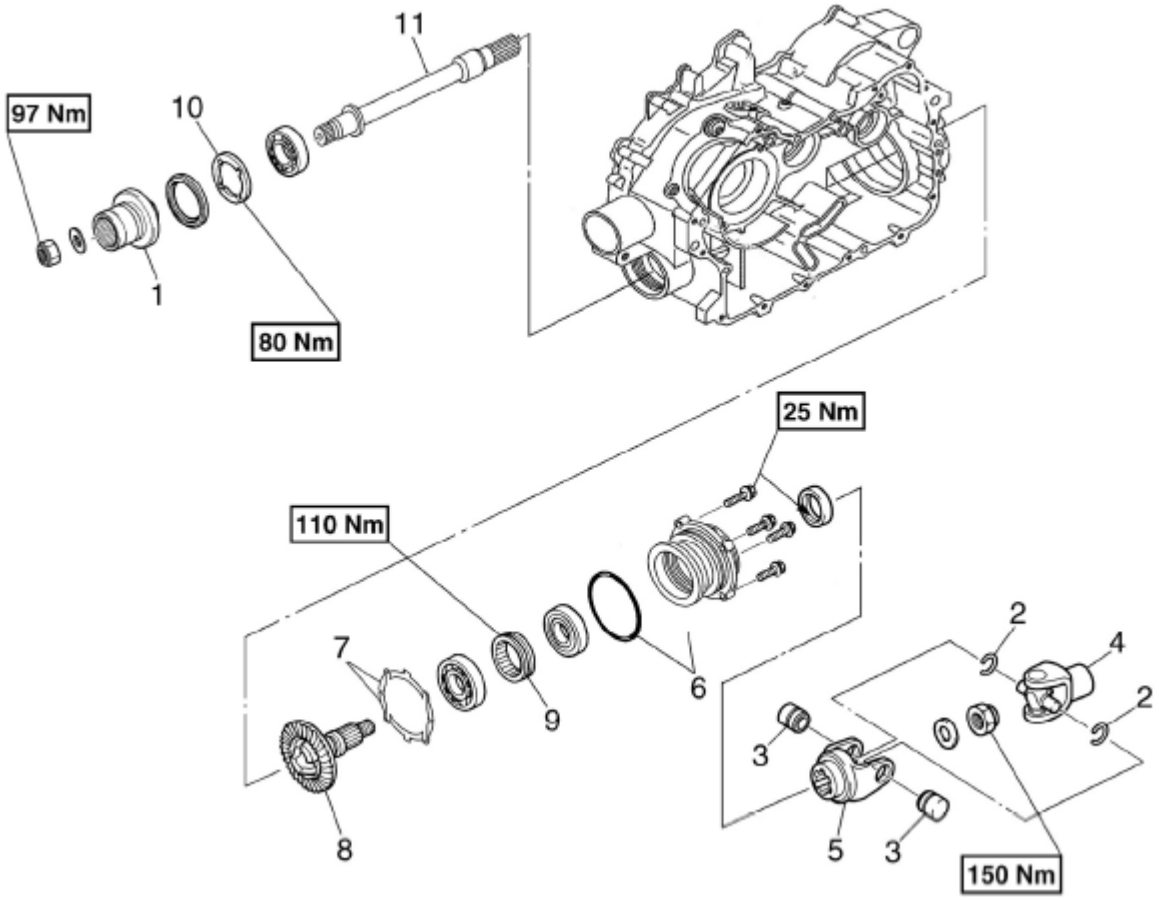

***Note:***
**Oil each gear and bearing thoroughly.**
**• Before assembling the crankcase, be sure that the transmission is in neutral and that the gears turn freely.**

## Middle Drive Shaft




| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| | **Removing the middle drive shaft** | | Remove the parts in the order listed. |
| | Crankcase separation | | |
| 1 | Bearing housing | 1 | |
| 2 | Middle drive gear | 1 | |
| 3 | Nut | 1 | |
| 4 | Middle drive pinion gear | 1 | |
| 5 | Shim | 1 | |
| 6 | Middle drive shaft | 1 | For installation, reverse the |
| 7 | Bearing retainer | 2 | order listed. |

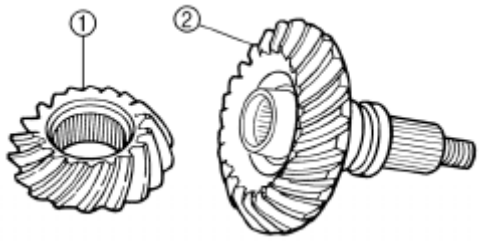
## Middle Driven Shaft




| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| | **Removing the middle drive shaft** | | Remove the parts in the order listed. |
| | Crankcase separation | | |
| 1 | Drive shaft coupling | 1 | |
| 2 | Circlip | 2 | |
| 3 | Bearing | 2 | |
| 4 | Universal joint | 1 | |
| 5 | Universal joint yoke | 1 | |
| 6 | Bearing housing/O-ring | 1/1 | |
| 7 | Shim | 1 | |
| 8 | Middle driven pinion gear | 1 | |
| 9 | Bearing retainer | 1 | |
| 10 | Bearing retainer | 1 | For installation, reverse the order listed. |
| 11 | Middle driven shaft | 1 | |

**Inspection**

Inspect the gear teeth of the drive pinion gear (1) and the driven pinion gear (2). Look for pitting, galling, wear or damage.




Replace the o-ring with a new one.

Inspect the bearings for pitting or damage. Check the movement of the universal joint. Look for roughness. It should move smoothly.

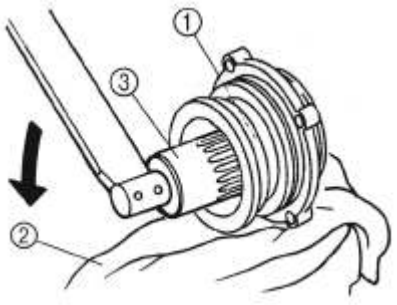
Selecting the middle drive and driven gear shims.

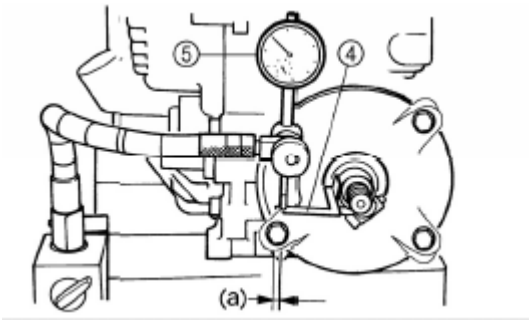
- When the drive and driven gear, bearing housing assembly and/or crankcase are replaced, be sure to adjust the gear shims (1) and (2).
- middle drive gear shim (1).
- middle driven gear shim (2).

Measure the gear lash.

**Middle gear lash**
**0.1 ~ 0.3 mm**

- Temporarily install the left crankcase.
- Wrap a rag (1) around a screwdriver (2), and then insert it into the installation hole (3) of the right crankcase speed sensor to hold the middle driven gear.
- Attach the gear lash measurement tool (4) and dial gauge(5).
  a)6.7 mm (0.26 in)
- Measure the gear lash while rotating the middle driven shaft back and forth.



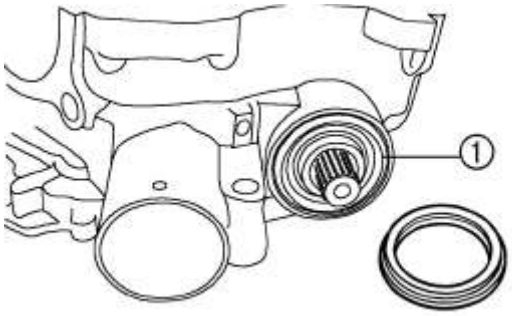




***Note:***
**Measure the gear lash at 4 positions. Rotate the middle driven gear 90° each time. If the gear lash is incorrect, adjust the gear lash by middle driven pinion gear shims and /or middle drive pinion gear shims.**

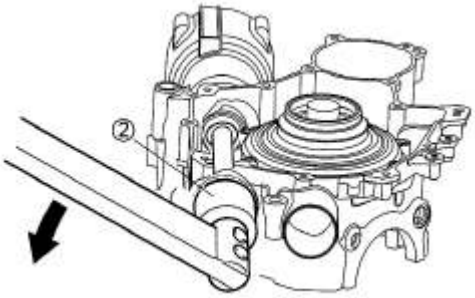
**Installation**

Install the middle driven shaft bearing retainer (1)

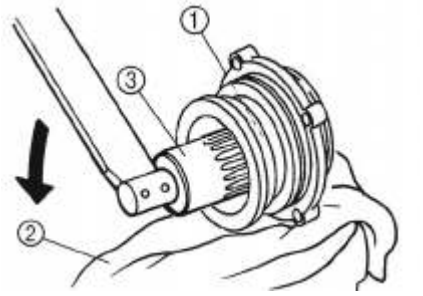
**Bearing retainer**
**80 Nm**




Attach the ring nut wrench (2) and turn it counterclockwise to tighten the retainer, (it has left handed threads).



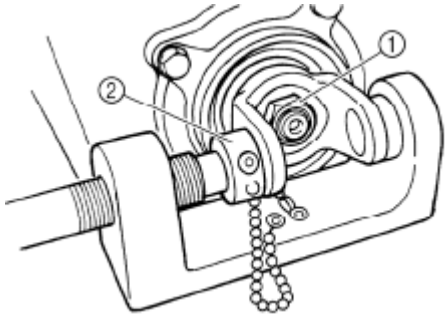

- bearing retainer (1)
  a. Place a rag (2) in the vise.
  b. Secure the bearing housing edge in the vise.
  c. Attach the bearing retainer wrench (3).
  d. Tighten the bearing retainer.




**Bearing retainer**
**110Nm**

Install the universal joint yoke, washer and nut (1).

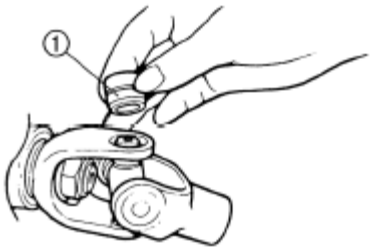
***Note:***
**Use the universal joint holder (2) to hold the yoke.**




**Universal joint yoke nut**
**150 Nm**

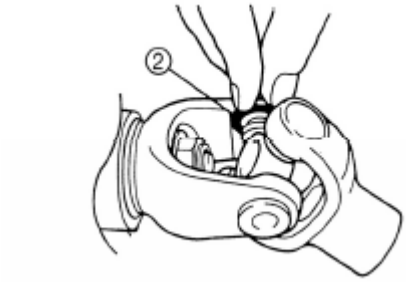
Install the universal joint, then install the opposite yoke onto the universal joint.

Apply wheel bearing grease to the bearings and install the bearing (1) onto the yoke.

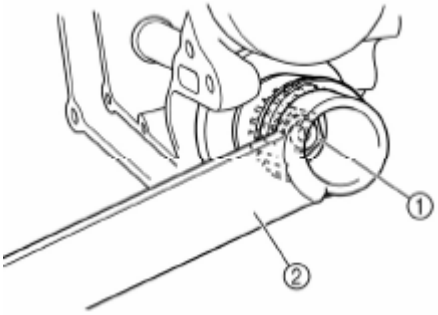



***Caution:***
**Check each bearing. The needles can easily fall out of their races. Slide the yoke back and forth on the bearings; the yoke will not go all the way onto a bearing if a needle is out of place.**

Press each bearing into the universal joint, using a suitable socket, far enough to allow installation of the circlip (2).



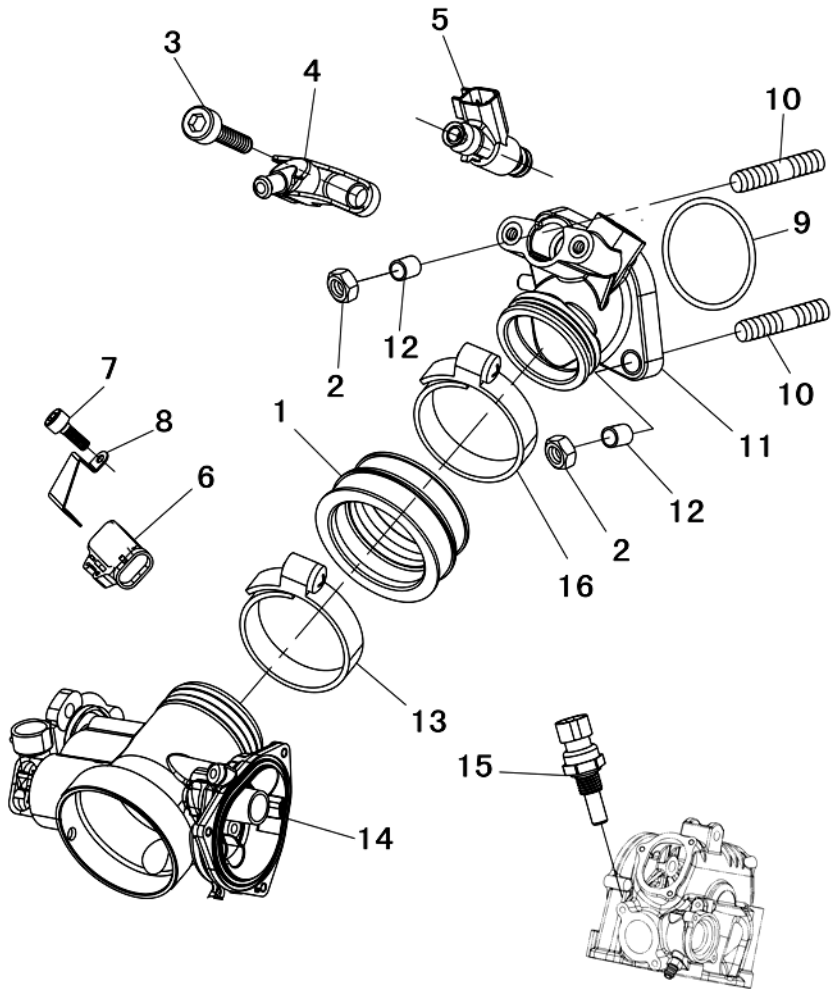

Install the drive shaft coupling, washer and nut (1) using the coupling gear/middle shaft tool (2) and torque to 97 Nm or 70 ft lbs.




Install the middle drive shaft

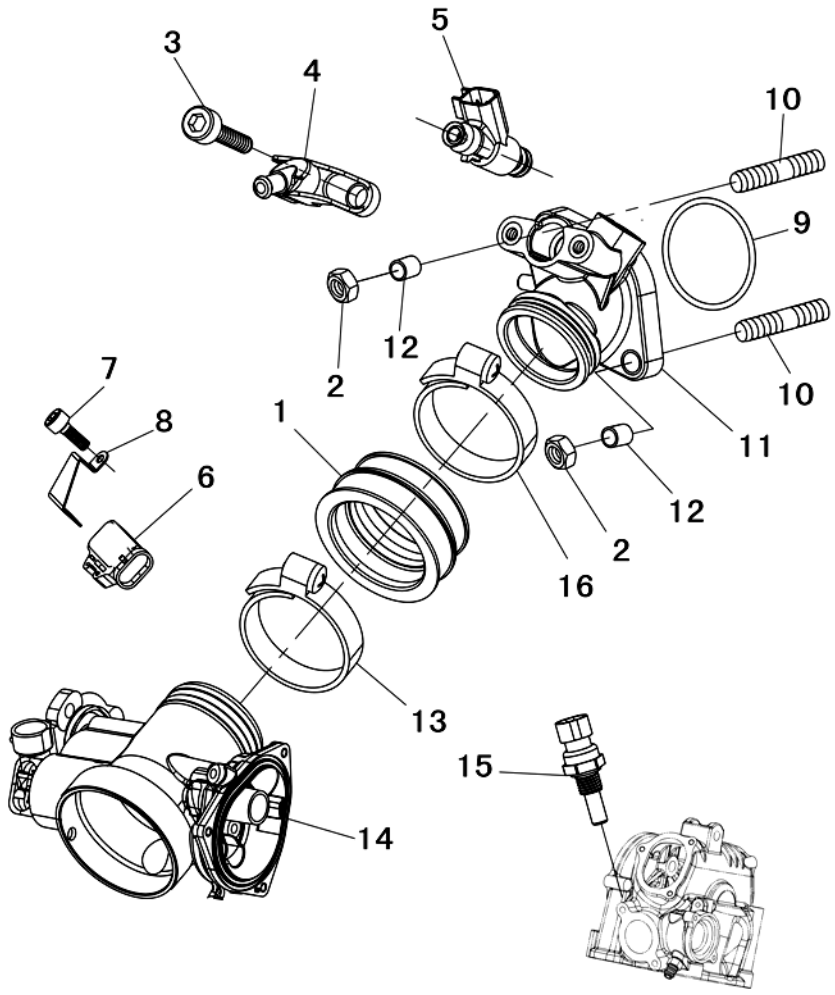
Tighten the middle drive pinion gear nut (1) to 145 Nm or 105 ft lbs. Secure the middle drive shaft in a vise with a clean rag. Once torque is achieved lock the threads with a drift punch.

## Intake Manifold Assembly




| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| | **Intake Assembly** | | |
| 1 | Intake Pipe joint | 1 | |
| 2 | Nut M8 | 2 | |
| 3 | Inner Hex screw M6 X 20 | 2 | |
| 4 | Fuel injector mounting base | 1 | |
| 5 | Fuel injector | 1 | |
| 6 | Inlet Temp/ pressure sensor | 1 | |
| 7 | Phillips panhead screw | 1 | |
| 8 | Tmap pressure plate (Delphi) | 1 | |
| 9 | O-ring | 1 | |
| 10 | Stud Bolt | 2 | |
| 11 | Intake pipe | 1 | |
| 12 | Collar | 2 | |

## Intake Assembly




| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| 13 | Clamp | 1 | |
| 14 | Damper (D42) | 1 | |
| 15 | Water temp Sensor | 1 | |
| 16 | Clamp | 1 | |

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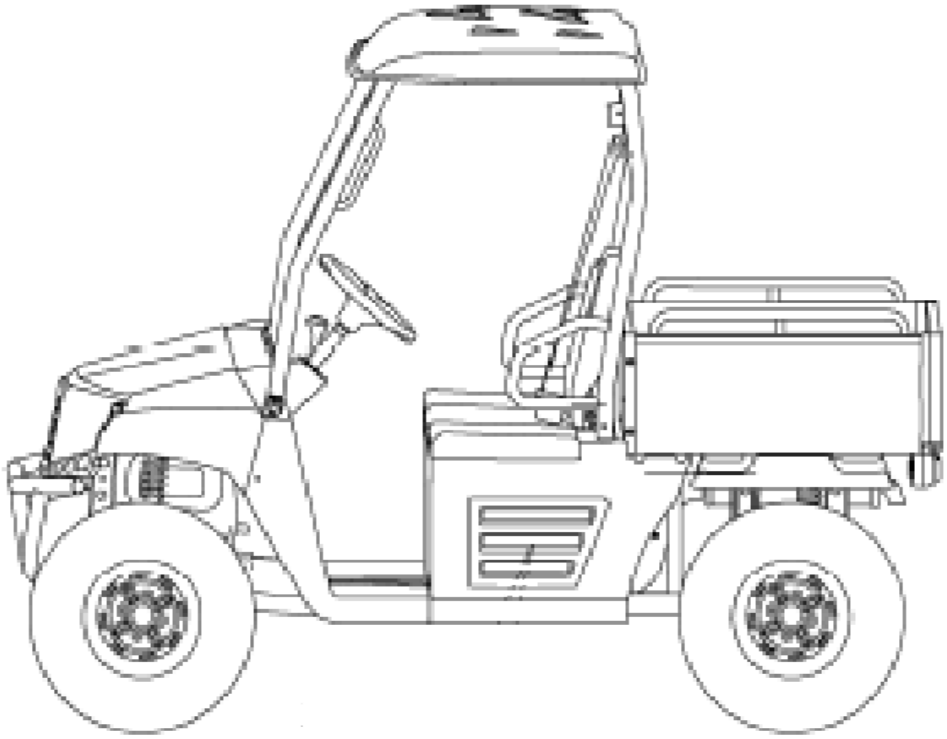
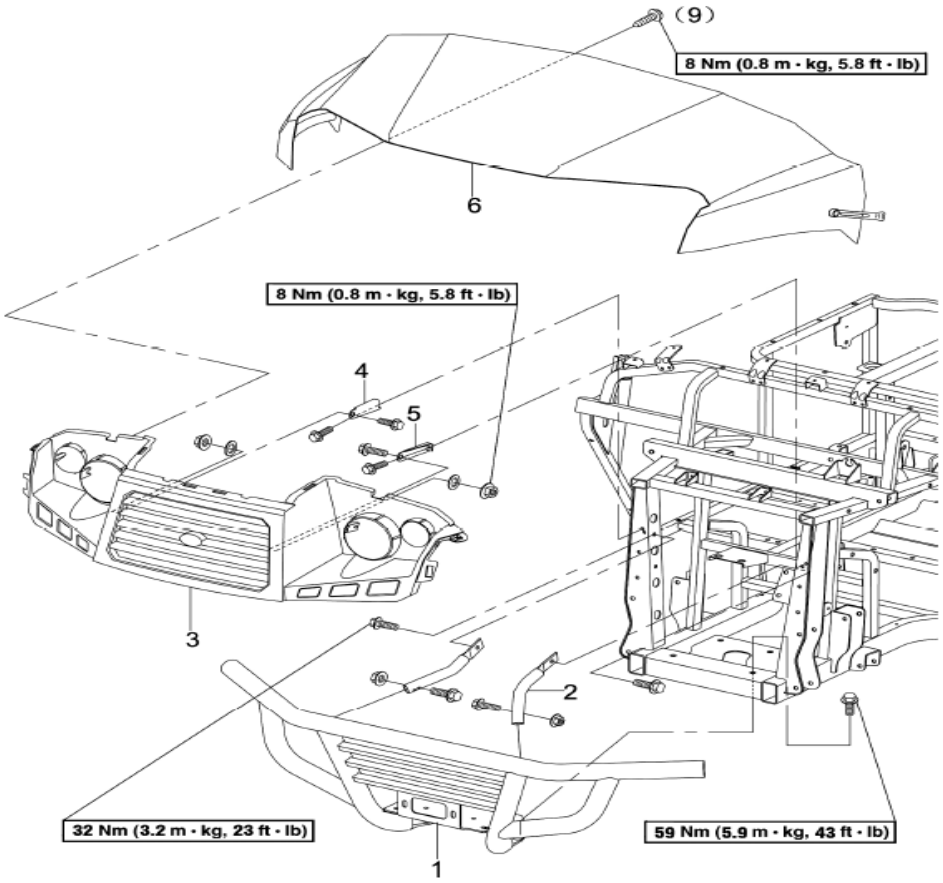


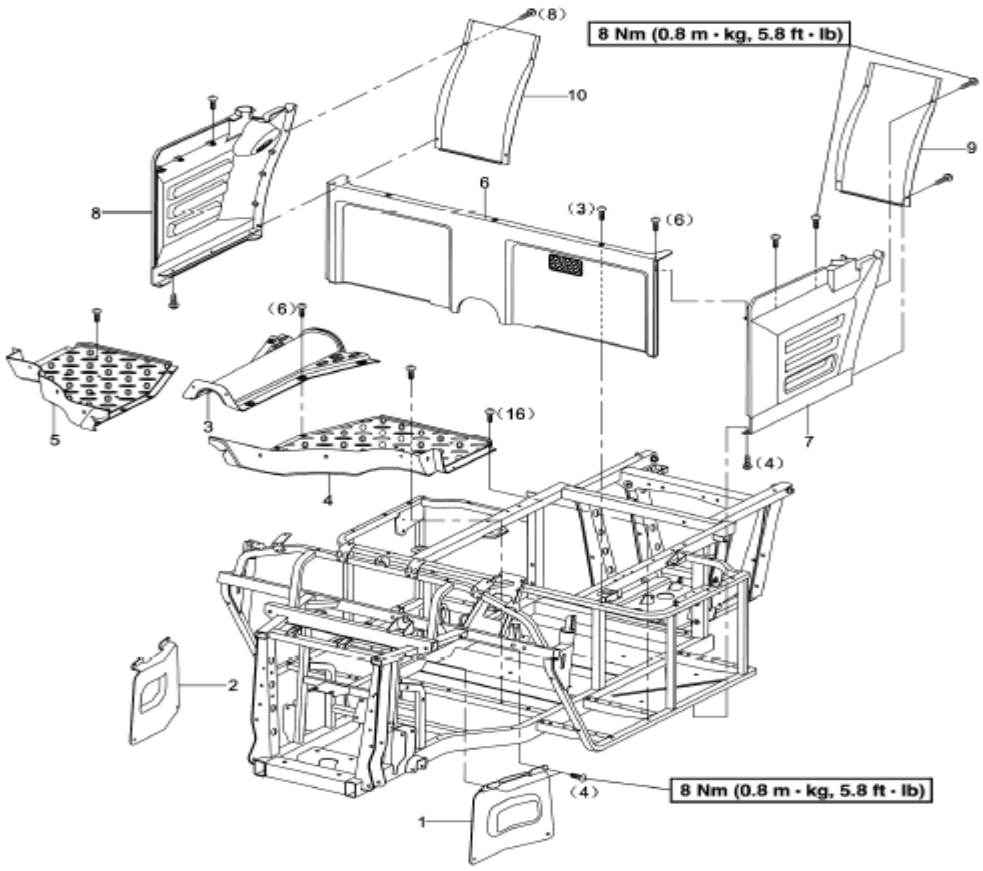

| | | | |
|---|---|---|---|
| **Front Bumper and Hood** | **5-3** | **Front Bridge** | **5-30** |
| **Panels and Footrest cover** | **5-4** | **Rear Bridge** | **5-38** |
| **Seat Support and seat cushion** | **5-5** | **Gearshift, Parking Brake** | **5-41** |
| **Roll-over Protection System** | **5-6** | **Pedal Assembly** | **5-46** |
| **Cargo Bed** | **5-7** | **Front Suspension** | **5-48** |
| **Steering System** | **5-9** | **Front Arm** | **5-50** |
| **Brake System** | **5-15** | **Rear Suspension** | **5-54** |
| **Front Brake discs** | **5-16** | **Rear A arm assembly** | **5-55** |
| **Rear Brake Caliper** | **5-20** | **Cooling System** | **5-57** |
| **Front Wheel** | **5-26** | **Water Pump** | **5-61** |
| **Rear Wheel** | **5-27** | **Seat** | **5-64** |
| | | **Fuel Tank** | **5-67** |

## Front Bumper and Hood



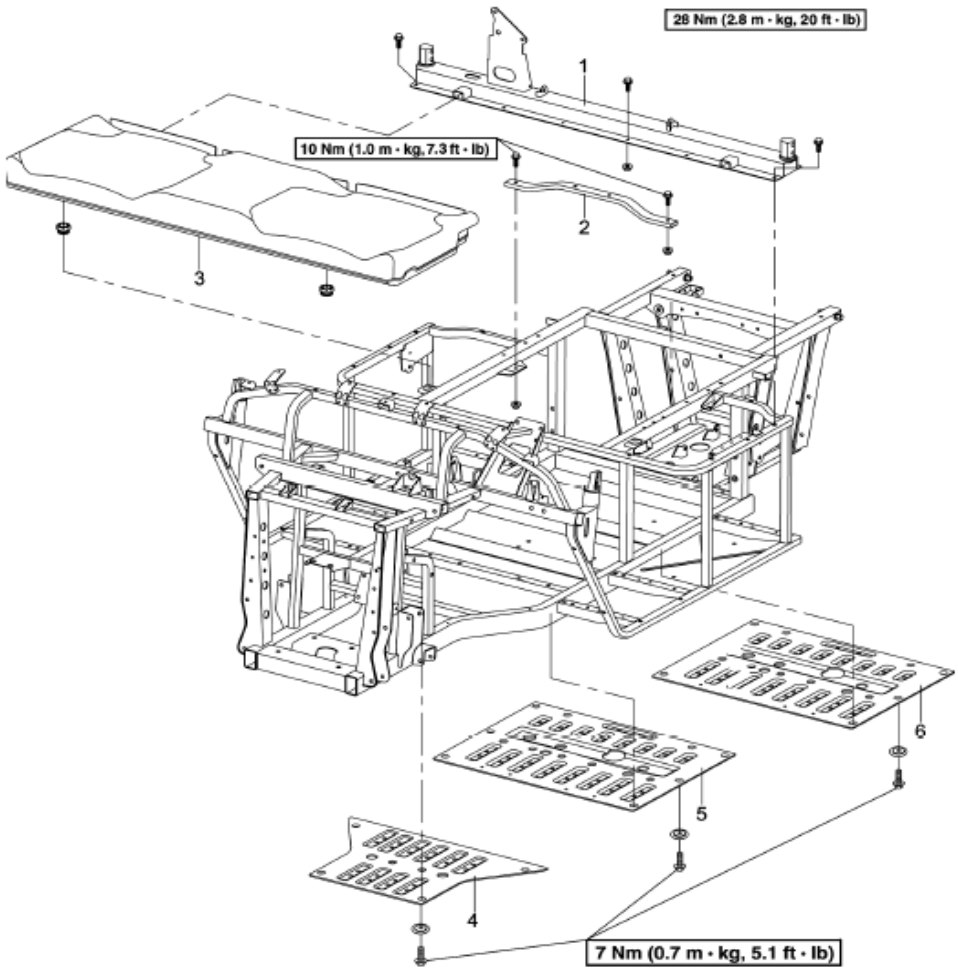

| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| | **Removing the front bumper and Hood** | | Remove the parts in the order listed. |
| 1 | Front Bumper Assembly | 1 | |
| 2 | Bumper Support | 1 | |
| 3 | Front headlight grille | 1 | |
| 4 | Right Mounting Lug, Front Panel | 1 | |
| 5 | Left Mounting Lug, Front Panel | 1 | For installation, reverse the order listed. |
| 6 | Hood | 1 | |

**Panels and Footrest Cover**



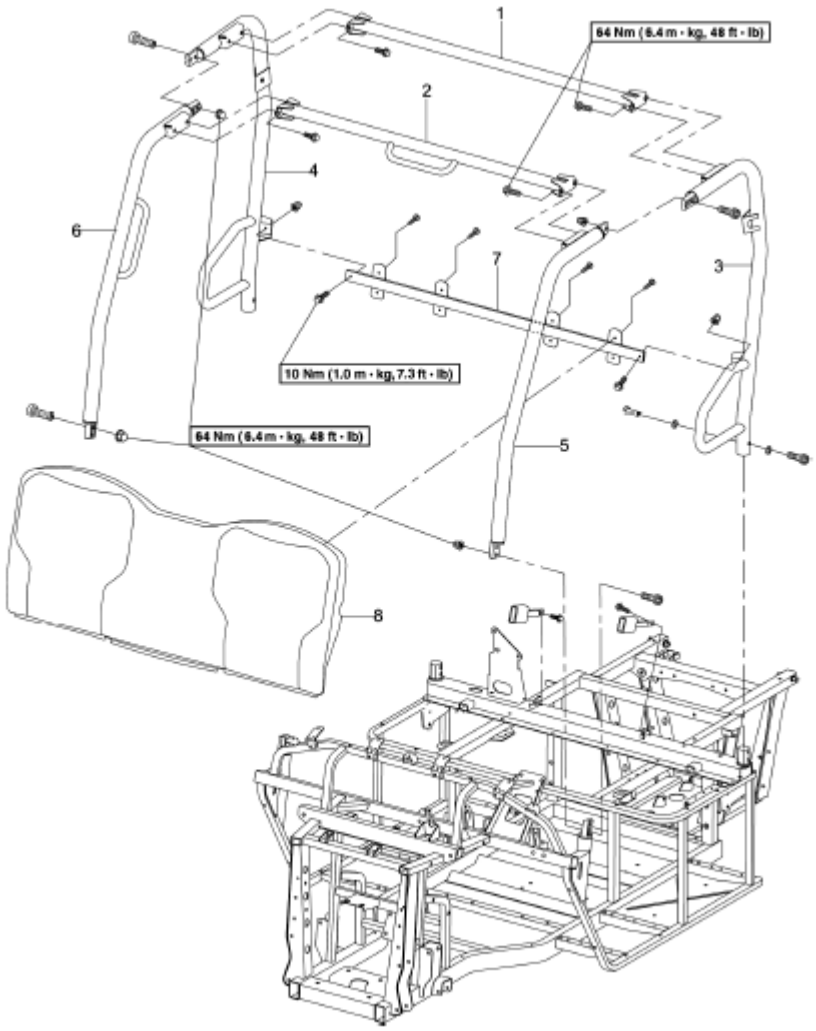

| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| | **Removing the panels and footrest covers** | | |
| 1 | Left Side Board | 1 | |
| 2 | Right Side Board | 1 | |
| 3 | Center Protective Board | 1 | |
| 4 | Left Footrest Pedal | 1 | |
| 5 | Right Footrest Pedal | 1 | |
| 6 | Seat Front Protection Board | 1 | |
| 7 | Rear Lateral Cover, Left | 1 | |
| 8 | Rear Lateral Cover, Right | 1 | |
| 9 | Rear Left Mud-guard Board | 1 | |
| 10 | Rear Right Mud-guard Board | 1 | |

**Seat Support and Seat Cushion**



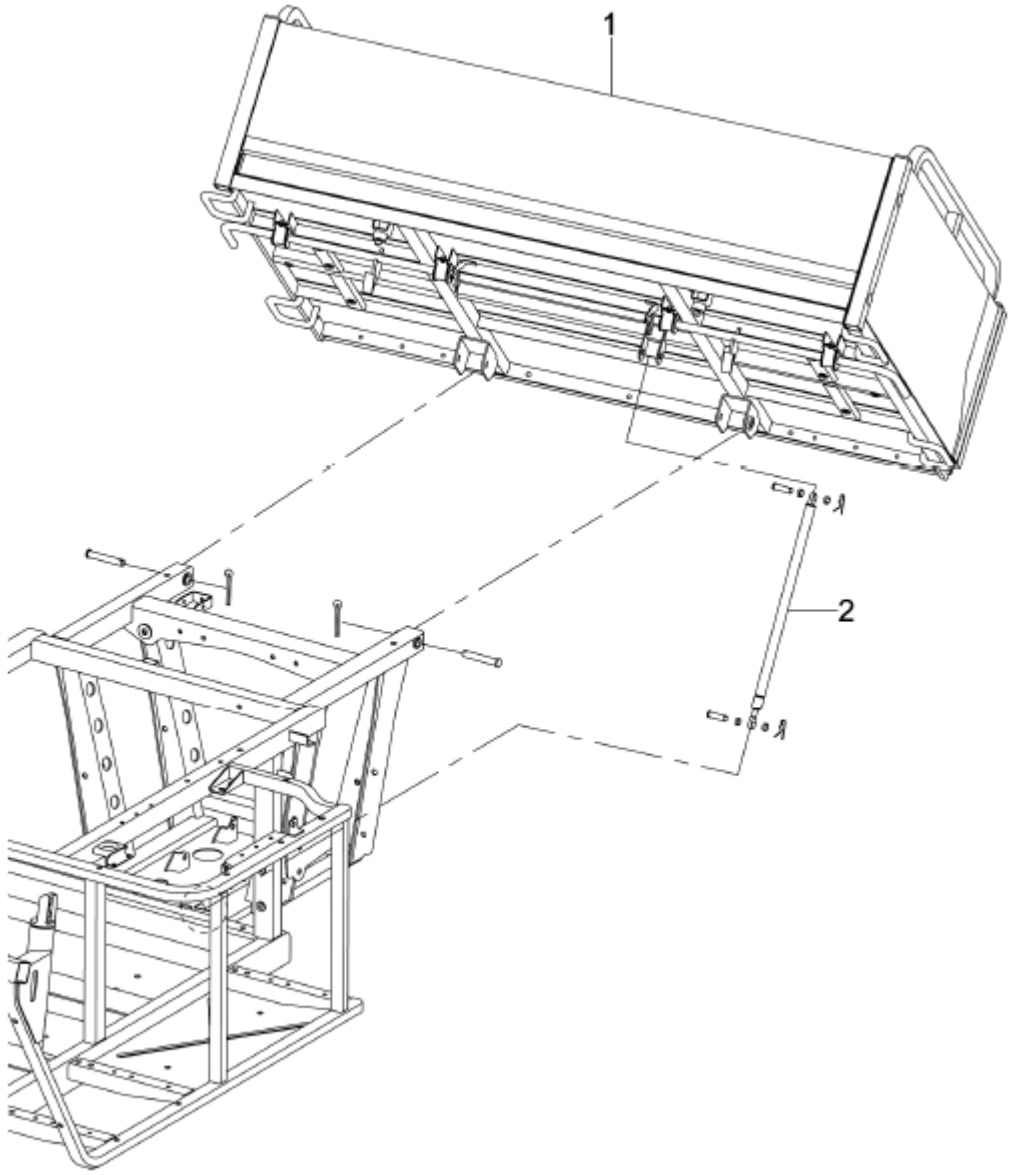

| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| | **Removing the seat support and seat cushion** | | |
| 1 | Seat Support Plate Assembly | 1 | |
| 2 | Seat Support | 1 | |
| 3 | Seat Cushion | 1 | |
| 4 | Front lower Protective Plate | 1 | |
| 5 | Middle lower Protective Plate | 2 | |

**Roll Over Protection System and Back Rest**



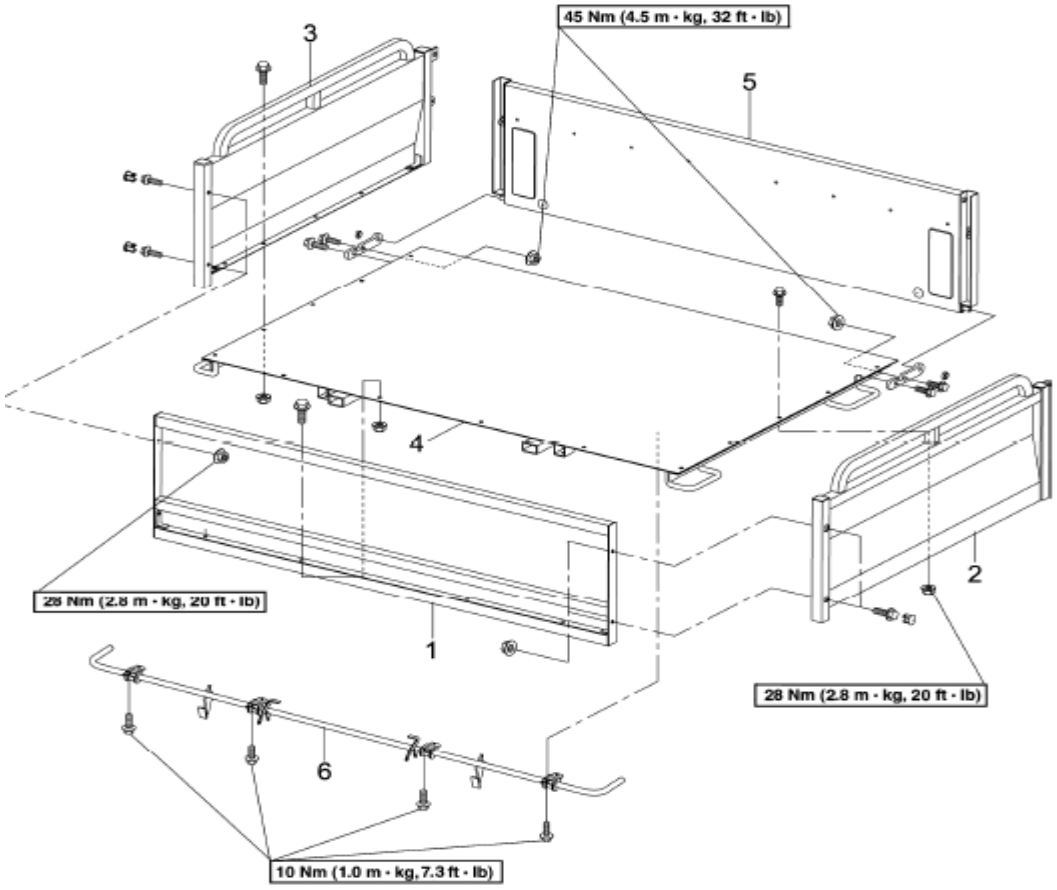

| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| | **Removing the ROPS and Back Rest** | | |
| 1 | Top Horizontal Tube Assembly II, Shed | 1 | |
| 2 | Top Horizontal Tube Assembly I | 1 | |
| 3 | Left Rear Shed Assembly | 1 | |
| 4 | Right Rear Shed Assembly | 1 | |
| 5 | Left Front Shed Assembly | 1 | |
| 6 | Right Front Shed Assembly | 1 | |
| 7 | Rear Lower Connecting rod | 1 | |
| 8 | Seat Cushion | 1 | |

**Cargo Bed**



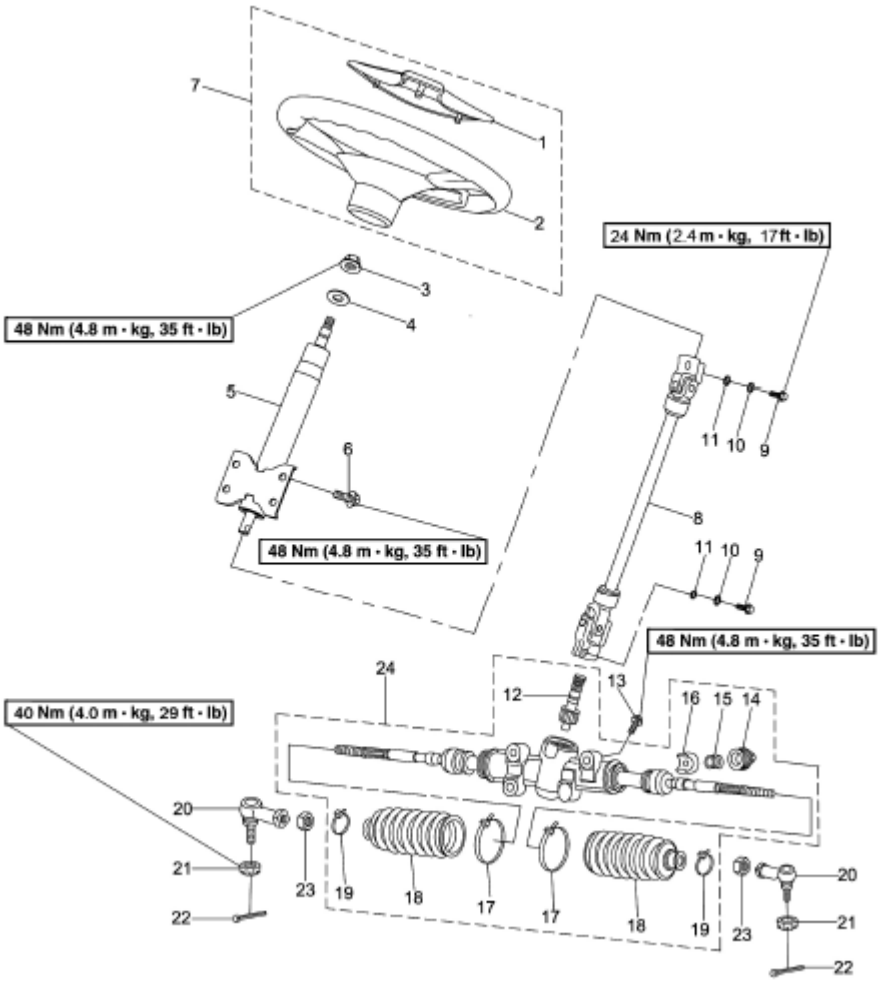

| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| | **Removing the cargo bed** | | |
| 1 | Cargo Bed Assembly | 1 | |
| 2 | T Gas Spring Assembly | 1 | |

**Cargo Bed Assembly**



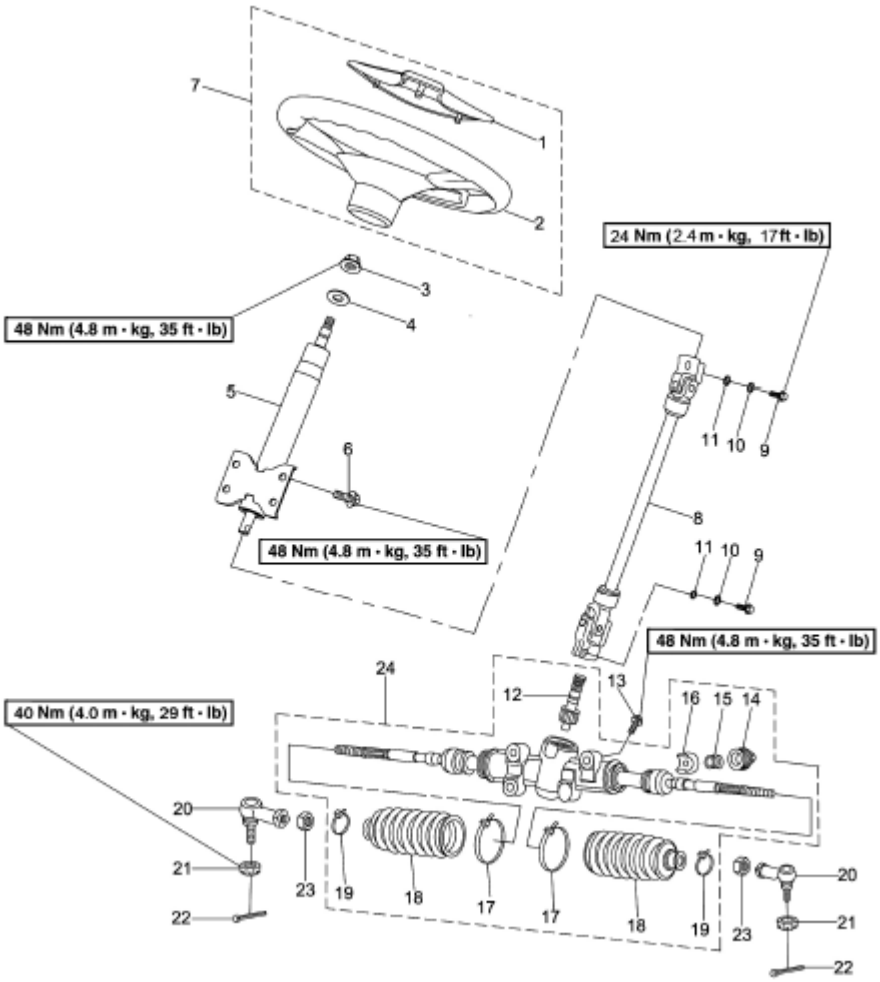

| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| | **Removing the cargo bed assembly** | | |
| 1 | Front Panel Assembly, Carrier | 1 | |
| 2 | Left Side board Assembly, Carrier | 1 | |
| 3 | Right Side board Assembly, Carrier | 1 | |
| 4 | Bottom Board Assembly, Carrier | 1 | |
| 5 | Carrier Door Assembly | 1 | |
| 6 | Dump bracket Assembly | 1 | |

**Steering System**




| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| | **Removing the steering system** | | |
| 1 | Plastic Cover | 1 | |
| 2 | Steering Wheel | 1 | |
| 3 | Hex Flange Self-locked Nut M12×1.25 | 1 | |
| 4 | Gasket | 1 | |
| 5 | Steering Column | 1 | |
| 6 | Hex Flange Bolt M10×1.25×20 | 4 | |
| 7 | Steering Wheel Component | 1 | |
| 8 | Steering Transmission Shaft Assembly | 1 | |
| 9 | Hex Flange Bolt M8×25 | 2 | |
| 10 | Circlip Φ8 | 2 | |
| 11 | Washer Φ8 | 2 | |

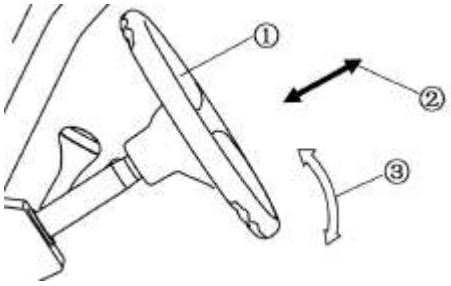
**Steering System**




| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| 12 | Steering Gear | 1 | |
| 13 | Hex Flange Bolt M10×1.25×30 | 4 | |
| 14 | Adjuster Cap | 2 | |
| 15 | Spring | 1 | |
| 16 | Washer | 2 | |
| 17 | Clamp L=300 | 2 | |
| 18 | Right Rubber Boot | 2 | |
| 19 | Clamp L=120 | 2 | |
| 20 | Tie Rod End, Steering Machine | 2 | |
| 21 | Hex Flange Nut M10×1.25 | 2 | |
| 22 | Cotter pin Φ3.5×20 | 2 | |
| 23 | Hex Nut M10×1.25 | 2 | |
| 24 | Rack and Pinion assembly | 1 | |

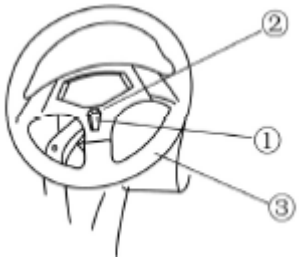
**Inspection**

Check for excessive movement of the steering column. Check the, up and down, side to side, movement. Check the rotating movement.

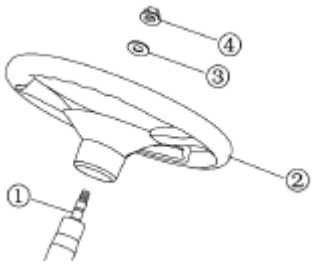



**Remove the steering Wheel**

Remove the center cover (1), the flange nut and washer (2) and the steering wheel (3).




If the grip part of the steering wheel is damaged it must be replaced with a new steering wheel.



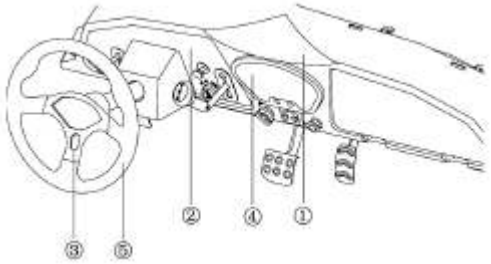

Inspect the internal splines of the steering wheel and the external splines of the steering shaft.

**Service Wear Limit**
**0.1 mm**

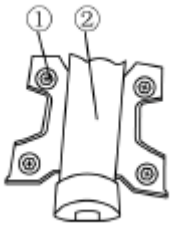
***Warning:***
***Any problems found in the steering system should be serviced immediately to ensure safe operation of the UTV.***

***Removing the steering column assembly.***

- Remove the dash board and steering wheel center cover

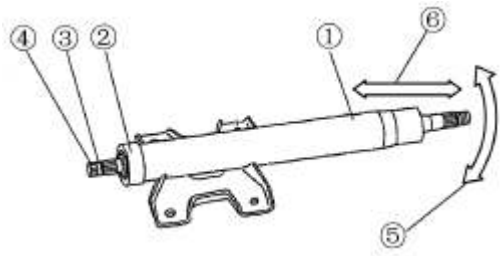



- Remove the steering column (2) by removing the flange bolts (1).



Inspect the steering column

- Steering column tube (1)
- Bearing (2)
- Steering Shaft (3)
- Spline (4)




Inspect the steering shaft for in and out movement and excessive play. If it is excessive, remove the shaft, bearings and bearing retainer. Check the bearings for damage, pitting or wear.

Inspect the splines on the steering shaft for wear or damage.

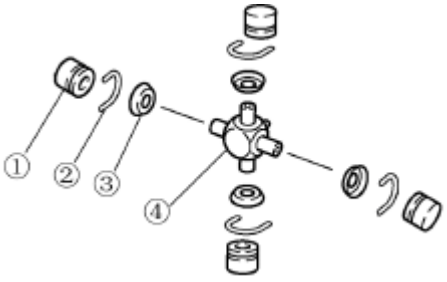
Inspect the welded bracket on the tube for cracks or corrosion.

Remove the Steering drive axle

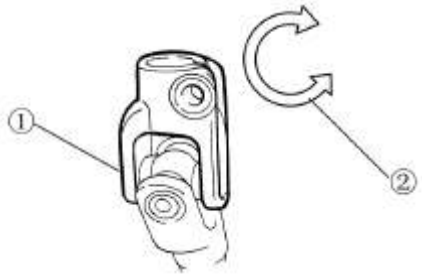
Loosen the clamp bolts on the yokes of the top and bottom u-joints.

Inspect the u-joints for movement.

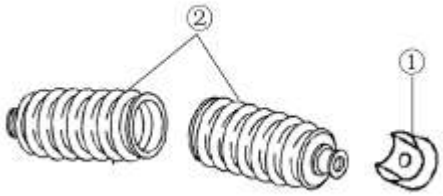
- Bearing (1)
- Circlip (2)
- Oil seal (3)
- Cross axis (4)



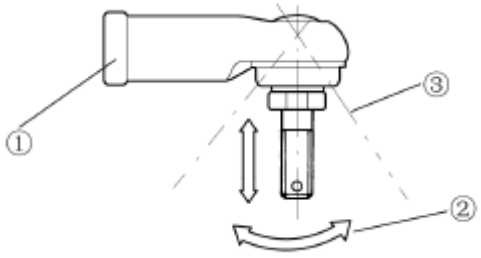

Inspect the steering joint (1) for turning movement (2).




Inspect the dust boots for cracks, splits, damage or wear. If replacement is necessary, be sure to fill approximately ½ with lithium grease on installation.




Inspect the tie-rod ends(1) for turning (2) And in and out free play (3).




Inspect the tie-rods for bends or damage.

Inspect the drive gear (1) and the spline gear for ease of movement. If roughness is found disassemble and look for wear in the splines.

***Warning***
***Never attempt to repair a steering joint by welding.***

***Note:***
***When replacing parts in the steering system, clean them and lubricate the moving parts with lithium grease.***

***Installation***

Install the rack and pinion assembly with 4 M10 X 30 bolts, the n install 2 locknuts M10.

**Bolt M10×30**
**48 Nm (4.8m · kg,35 ft · lb)**
**Nut M10**
**40 Nm (4.0m · kg,29 ft · lb)**

Install the steering transmission shaft to the rack and pinion assembly with 1 M8 X 20 flange bolt.

**Bolt M8×20**
**32 Nm (3.2m · kg,23 ft · lb)**

Connect the steering transmission shaft and the steering column tube with 1 8M X20 flange bolt, then use 4 M8 X 16 flange bolts to attach it to the frame.

**Bolt M8×16**
**24 Nm (2.4m · kg,17 ft · lb)**

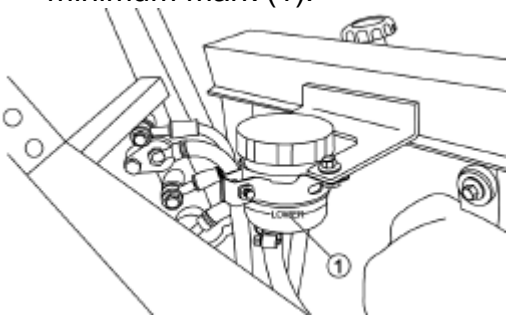
Install the steering wheel with the M12 X 1.25 nut and washer.

**Steering wheel tight of force**
**48 Nm(4.8m · kg,35 ft · lb)**

**Brake system**

The Brake system is crucial to the life safety of the operator and passengers therefore, it must be periodically inspected and maintained. This vehicle uses the double return route hydraulic pressure disc brake system. Please follow the tips of inspection as below.

1 Check the amount of Brake Fluid in the reservoir. If it is lower than the minimum mark, refill the reservoir with the same type of fluid as was recommended by the manufacturer, to ensure to fluid level is higher than the minimum mark (1).

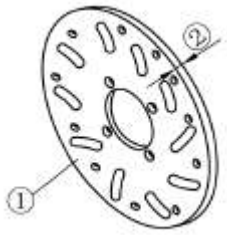



2 The brake pedal should be kept between 20mm-30mm, Otherwise, please adjust the screw to meet required travel distance.

3 Inspect the brake pedal feel. If it feels spongy the brakes will need to be bled and fluid in the reservoir filled.

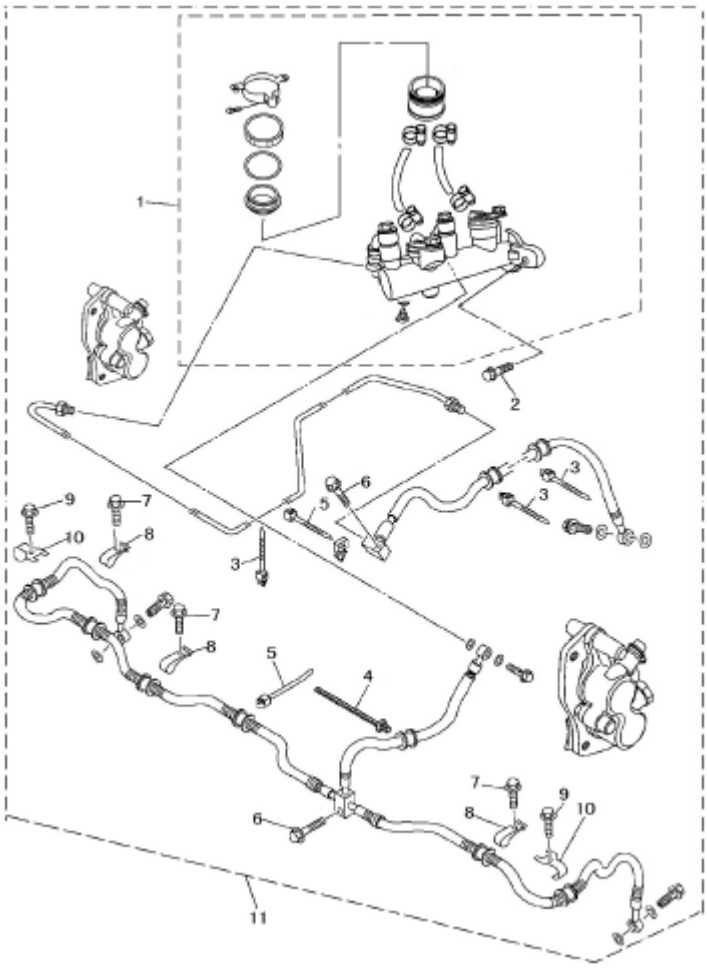
**Must use DOT4 Brake Fluid**

4 Periodical inspection of the wear condition of rear brake disc is also necessary. The brake disc must be replaced depending on its wear condition. Inspect for warpage (1) and disc thickness (2).



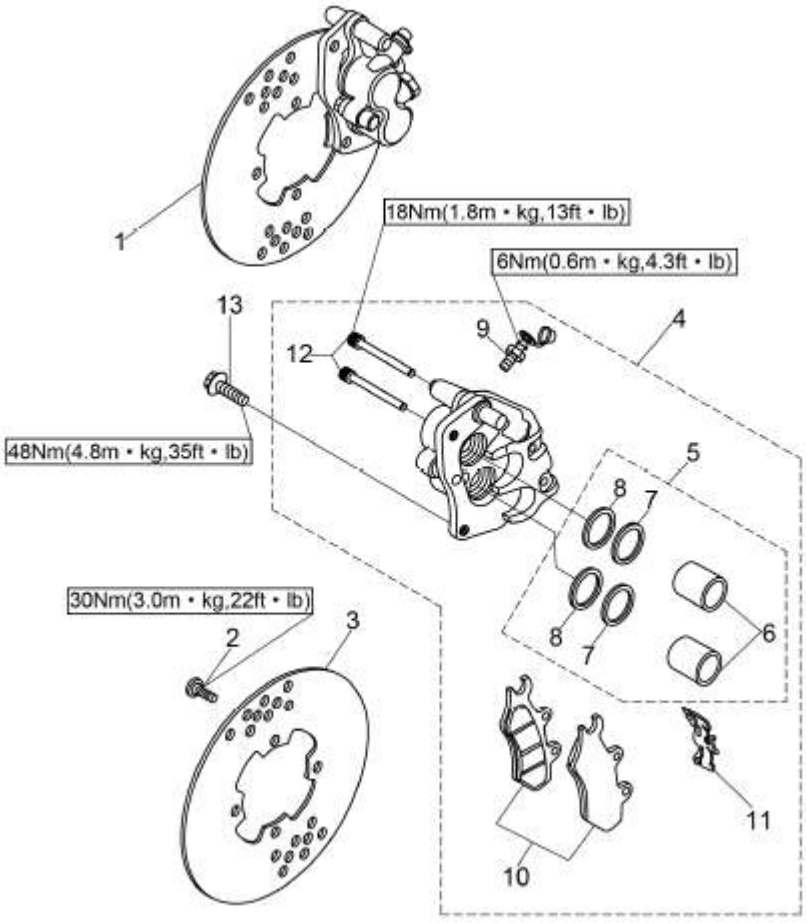

5 Disk brakes use hydraulic pressure of brake fluid. Therefore, brake lines must be periodically inspected and replaced. Inspection method: If the brake line has aging, cracks or distortion, you must replace it.

## Brake system




| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| | **Removing the brake components** | | |
| 1 | Master cylinder | 1 | |
| 2 | Six-Angle Flange Bolt M6×20 | 1 | |
| 3 | Belt 3 L=150 | 2 | |
| 4 | Belt 4 L=200 | 4 | |
| 5 | Belt 3 L=150 | 4 | |
| 6 | Hex Flange Bolt M6×30 | 1 | |
| 7 | Hex Flange Bolt M6×20 | 1 | |
| 8 | Oil Pipe Clip 1, Front Disc Brake | 3 | |
| 9 | Hex Flange Bolt M6×20 | 4 | |
| 10 | Oil Pipe Clip □, Front Disc Brake | 2 | |
| 11 | Brake assembly (3 IN 1) | 1 | |
| 12 | Rear Disc Brake Oil Pipe Assembly | 1 | |
| 13 | Front Disc Brake Oil Pipe Assembly | 1 | |

## Front Brake Discs




| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| | **Removing front brake caliper** | | |
| 1 | Brake caliper assembly | 1 | |
| 2 | Bolt | 4 | |
| 3 | Brake disc | 1 | |
| 4 | Brake caliper assembly | 1 | |
| 5 | Brake caliper, piston assembly | 1 | |
| 6 | Brake caliper piston | 2 | |
| 7 | Dust seal | 2 | |
| 8 | Caliper piston seal | 2 | |
| 9 | Bleed screw | 1 | |
| 10 | Brake, pad | 1 | |
| 11 | Pad spring | 1 | |
| 12 | Brake pad holding bolt | 2 | |
| 13 | Bolt, flange | 2 | |

**Inspection**

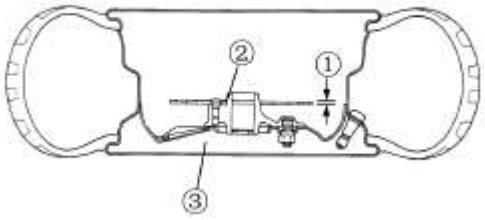
Inspect the brake disc for galling or damage.

Measure the brake disc deflection.

**Brake disc maximum deflection**
**0.10 mm (0.004 in)**

Measure the brake disc thickness (1).

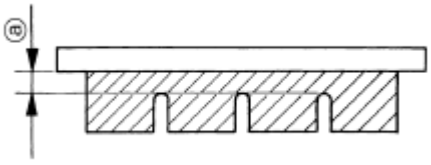
**Brake disc minimum thickness**
**3.0 mm (0.12 in)**




***Note:***
***If replacement of the brake disc is necessary, apply locking agent to the bolts that attach the disc.***

Inspect the Front Brake Pads (1) for damage or wear.

Measure the brake pad thickness (a).

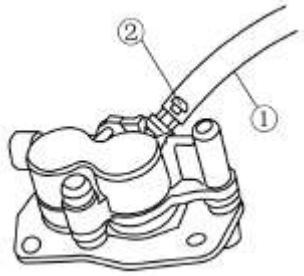



**Brake pad wear limit**
**1.5 mm (0.06 in)**

**Installation**

***Note:***
**Always install new brake pads and brake pad spring as a set.**

1. Connect a suitable hose (1) to the caliper bleed screw (2). Put the other end into a suitable brake fluid catch container.




2. Loosen the brake caliper bleed screw and using a finger push the caliper piston into the caliper.

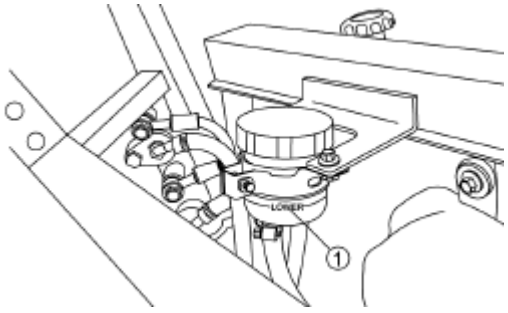
3. Tighten the Brake caliper bleed screw.

**Brake caliper bleed screw**
**6 Nm (0.6 m · kg, 4.3 ft · lb)**

4. Install the retaining bolts and brake caliper.

**Brake pad holding bolt**
**18Nm (1.8 m · kg, 13 ft · lb)**
**Brake caliper mountiong bolt**
**48Nm (4.8 m · kg, 35ft · lb)**

5. Check and refill the brake reservoir to above the minimum level indicator (1).

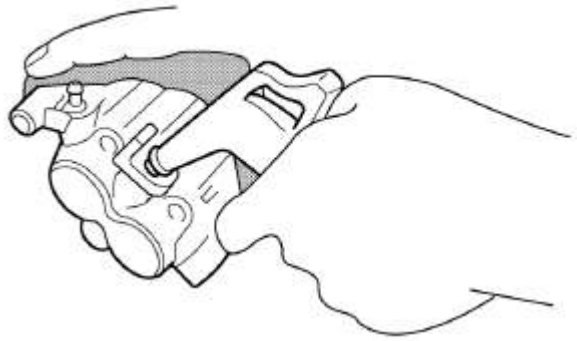



6. Check the brake pedal feel. If it feels spongy bleed the brakes.

**Disassembling the front brake calipers**

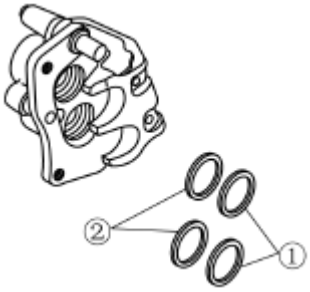
Remove the brake line from the caliper and remove the caliper from the UTV.

Remove the bleed screw and place a rag in the caliper to catch the pistons as you use compressed air to blow them out of the caliper body.



***Warning:***
***Cover the caliper piston with a rag. Be careful not to get injured when the piston is expelled from the caliper cylinder. Keep your fingers out of the way.***

Remove the dust seals (1) and caliper piston seals (2).

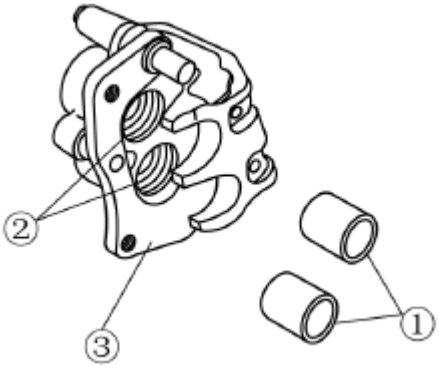



Inspect the brake caliper pistons (1) for scratches, rust, pitting or wear.

Inspect the cylinders (2) for scratches or wear.

Inspect the caliper body (3) for cracks or damage.

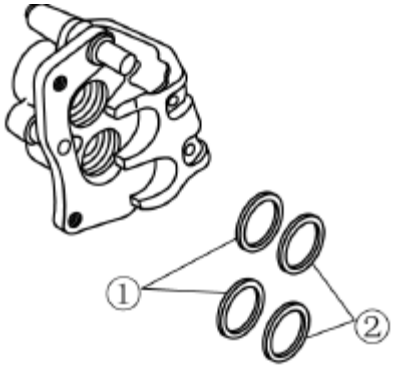
Blow out the brake fluid passageways with compressed air.




***Warning:***
***Always replace the caliper piston seals and dust seals whenever the caliper has been disassembled.***

***Assembly***

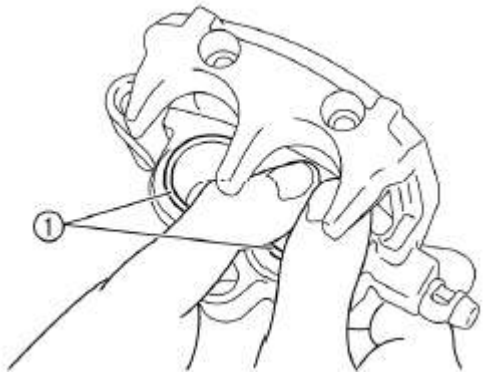
Install the caliper piston seals (1), and the dust seals (2)



***Warning:***
***All internal brake components should be cleaned and lubricated with new brake fluid only before installation.***

**Must use DOT4 Brake Fluid**

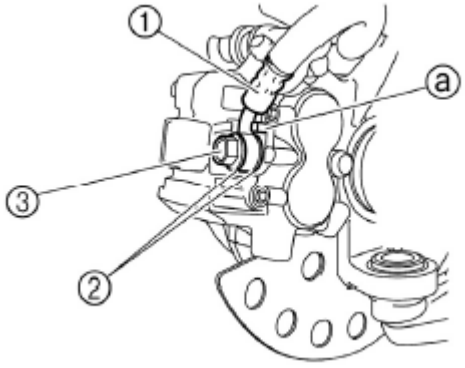
Install the brake caliper pistons (1). Press the piston into the caliper.




Install the caliper onto the mount using the flange bolts.

**48Nm (4.8m · kg,35 ft · lb)**

Install the brake hose (1) with 2 new copper crush washers (2) and the banjo bolt (3). Align the brake hose so that the fitting touches the projection (a) on the caliper.




***Warning:***
***Proper brake hose routing is essential to insure safe vehicle operation.***

Install the bleed screw into the caliper but do not fully tighten. Install clear hose onto the bleed screw and the other end into a suitable brake fluid catch container.

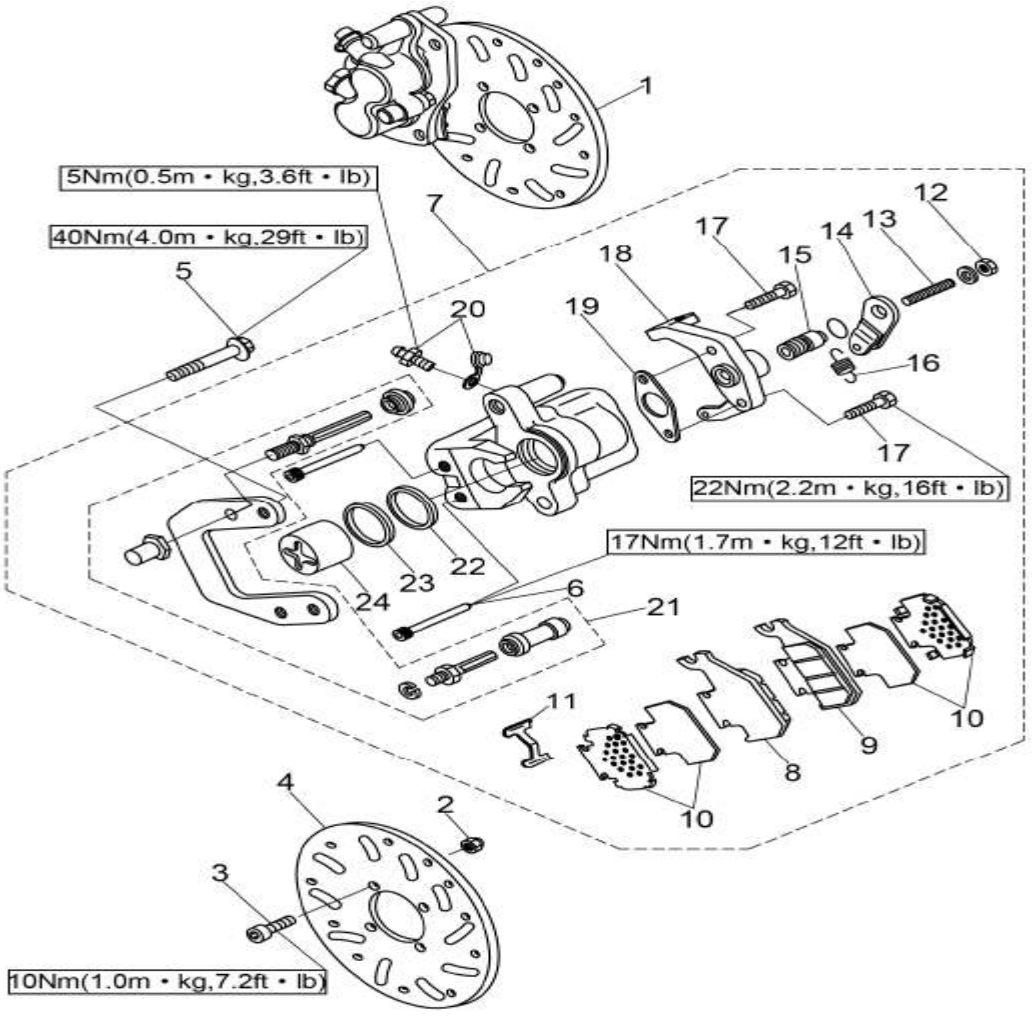
Fill the Brake fluid reservoir with new fluid.

**Must use DOT4 Brake Fluid**

Bleed the brake system. Be sure to always keep the reservoir full so that the system does not take in any more air.

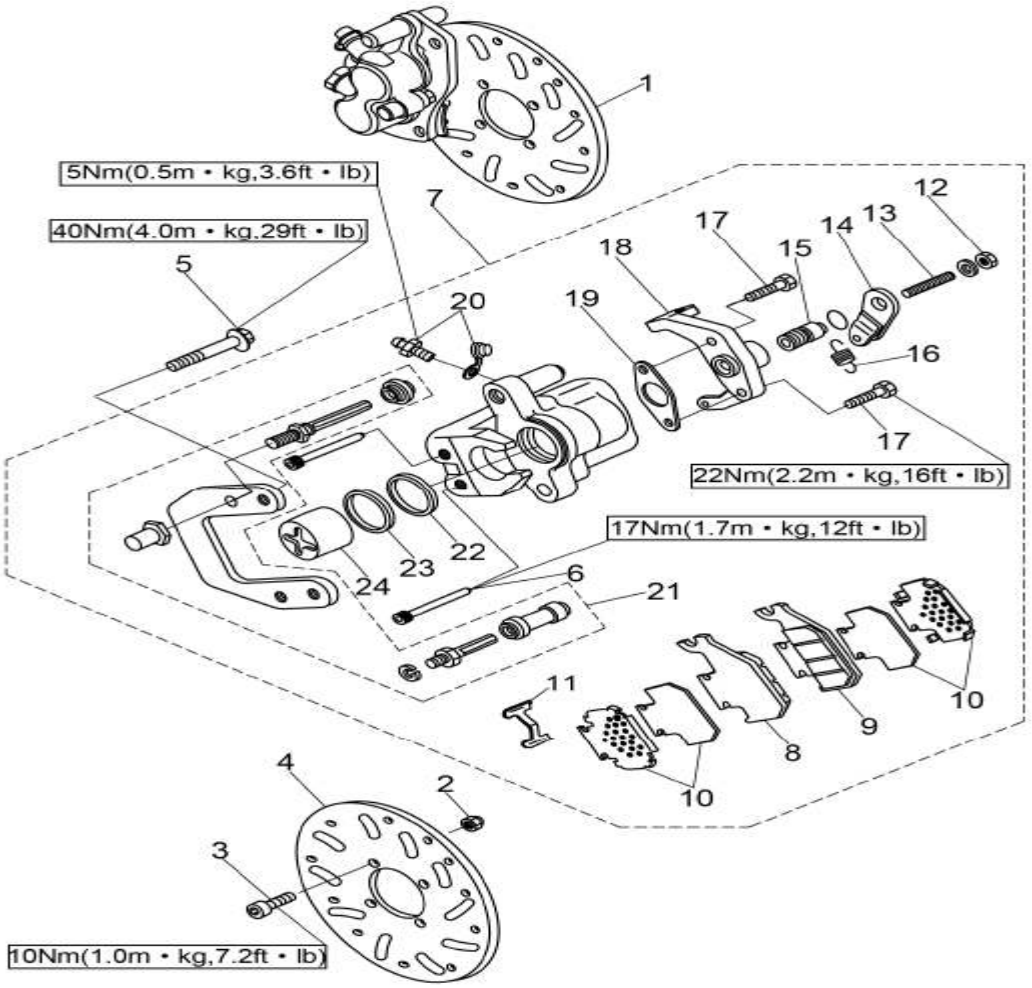
Finish by topping off the reservoir and putting the cap on the reservoir. Pump the brake pedal and notice the feel. If there is any sponginess the brakes will need further bleeding.

## Rear Brake Caliper




| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| | **Removing the rear brake caliper** | | |
| 1 | Brake caliper assembly | | |
| 2 | Nut | | |
| 3 | Bolt | | |
| 4 | Brake disc | | |
| 5 | Bolt, flange | | |
| 6 | Brake pad holding bolt | | |
| 7 | Brake caliper assembly | | |
| 8 | Brake, pad | | |
| 9 | Brake pad (piston side) | | |
| 10 | Insulator/pad shim | | |
| 11 | Pad spring | | |

## Rear Brake Caliper




| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| 12 | Parking brake arm nut | | |
| 13 | Set bolt | | |
| 14 | Parking brake arm | | |
| 15 | Parking brake arm shaft | | |
| 16 | Spring | | |
| 17 | Parking brake case bolt | | |
| 18 | Parking brake case | | |
| 19 | Gasket | | |
| 20 | Bleed screw | | |
| 21 | Brake caliper bracket | | |
| 22 | Caliper piston seal | | |
| 23 | Dust seal | | |
| 24 | Brake caliper piston | | |

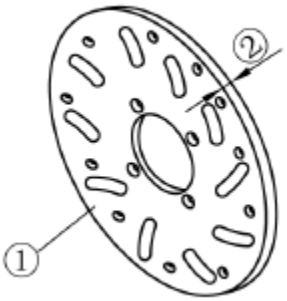
**Inspection**

Inspect the brake disc for galling or damage.

Measure the disc deflection.

**Brake disc maximum deflection**
**0.10 mm (0.004 in)**

Measure the brake disc thickness (2).




**Brake disc minimum thickness**
**4.5 mm (0.18 in)**

**REPLACING THE REAR BRAKE PADS**

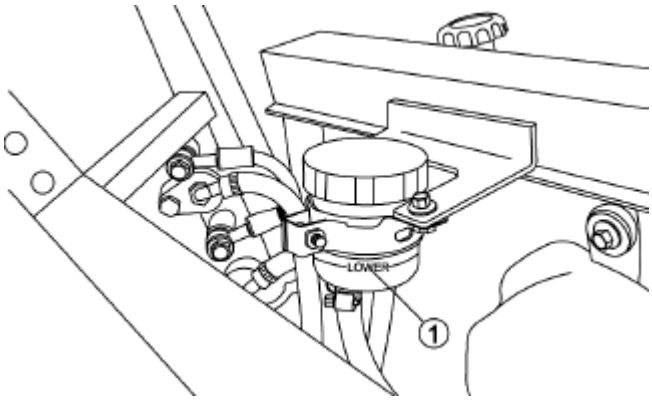
Check the brake pad plate and pad for damage or wear.

Measure the brake pad thickness.

**Brake pad wear limit**
**1.0 mm (0.04 in)**

***Note:***
***Always install new brake pads, new brake pad shims, new insulators, and a new brake pad spring as a set.***

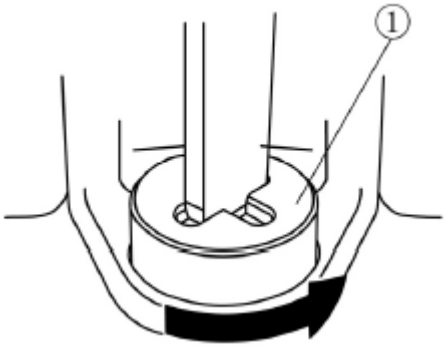
Check the brake fluid level in the reservoir.
Be sure to always keep the fluid above the minimum level indicator on the reservoir.




***Must use DOT4 Brake Fluid***

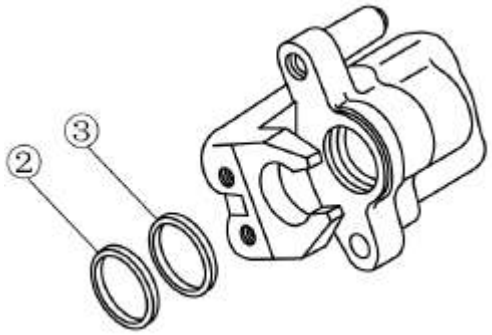
**DISASSEMBLING THE REAR BRAKE CALIPER**

1. Remove:
   - brake caliper piston (1)




   - dust seal (2)
   - caliper piston seal (3)

a. Turn the brake caliper piston counterclockwise to remove it.
b. Remove the dust seal (2) and caliper piston seal (3).

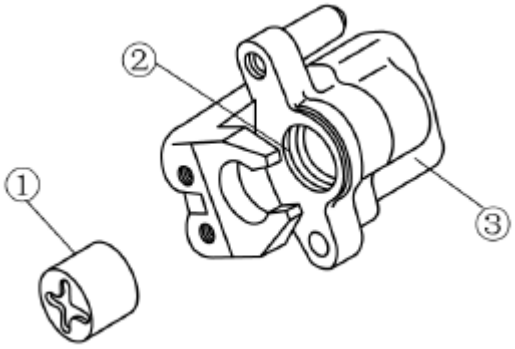


***Warning:***
***All internal brake components should be cleaned in new brake fluid only. Do not use solvents as they will cause seals to swell and distort.***

Inspect the brake caliper piston(1) for scratches, rust, corrosion or wear.

Inspect the cylinder (2) for scratches or wear.

Inspect the caliper body (3) for cracks or damage.




Blow out the brake fluid passageways with compressed air.

***Warning:***
***Replace the caliper piston seals and dust seals whenever the brake caliper is disassembled.***

**ASSEMBLING THE REAR BRAKE CALIPER**

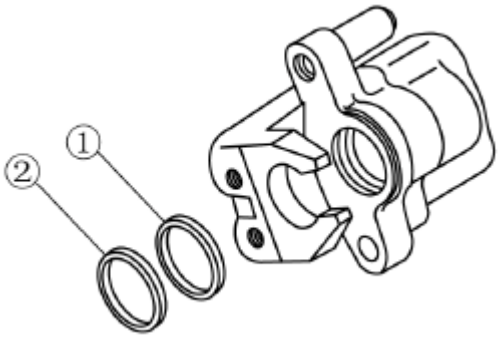
***Warning:***
***All internal brake components should be cleaned and lubricated with new brake fluid only before installation.***

**Must use DOT4 Brake Fluid**

**Installation**

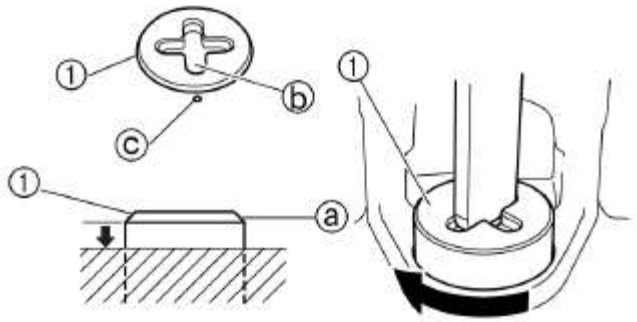
1. Install:

- caliper piston seal (1)
- dust seal (2)




2. Install:

- brake caliper piston (1). Turn the brake caliper piston clockwise until section (a) of the brake caliper piston is level with the surface of the brake caliper body.

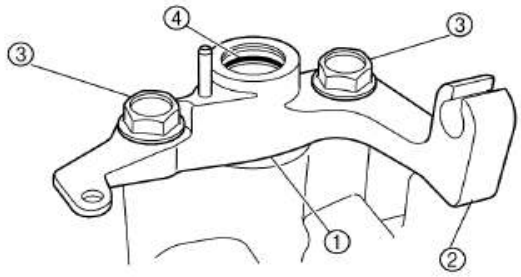



***Note:***
**Align an end (b) of the groove in the brake caliper piston with the punch mark (c) on the brake caliper body.**

3. Install:
- gasket (1)
- parking brake case (2)
- parking brake case bolts (3)

**22Nm (2.2 m · kg,16 ft · lb)**

- O-ring (4)

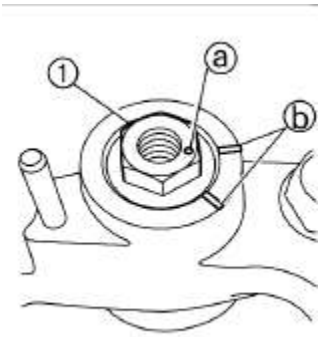



4. Install

- parking brake arm shaft (1)
- parking brake arm (2)
- set bolt (3)
- parking brake arm nut (4)

***Note:***
**Apply lithium-soap-based grease to the parking brake arm shaft and set bolt .**

Screw in the parking brake arm shaft counterclockwise completely so that the punch mark (a) on the parking brake arm
shaft is between the alignment marks (b).




***Note:***
**The hole for the parking brake arm shaft has multiple threads. If the punch mark (a) on the parking brake arm shaft is not between the alignment marks (b) when the parking brake arm shaft is screwed in completely, remove the parking brake arm shaft and screw it in from a different starting position.**

Turn the parking brake arm shaft approximately 60° clockwise.

Install the parking brake arm to the parking brake arm shaft so that the punch mark (c) on the parking brake arm is aligned with the punch mark (a) on the parking brake arm shaft.

Turn the parking brake arm until it contacts the pin (d).

Finger tighten the set bolt.

Tighten the parking brake arm nut.

Install the brake pad (piston side) (1) with the insulator and pad shim.

***Note:***
**Align the projection a on the piston side of the brake pad with the groove in the brake caliper piston.**

Install the brake pad holding bolts.

**17Nm (1.7 m · kg,12 ft · lb)**

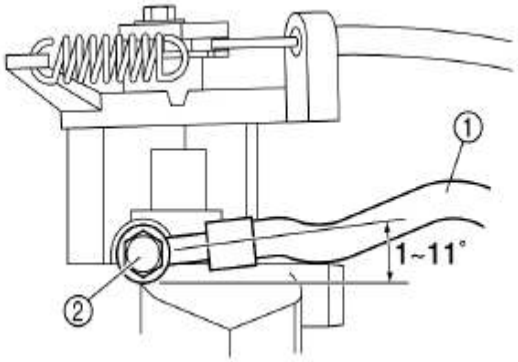
**INSTALLING THE REAR BRAKE CALIPER**

1. Install:
- brake caliper assembly
- brake caliper mounting bolts

**40Nm (4.0m · kg,29 ft · lb)**

- brake hose (1)
- copper washers
- union bolt (2)

**48Nm (4.8m · kg,35 ft · lb)**




***Note:***
**Tighten the union bolt while holding the brake hose as shown.**

**Warning:**
***Proper brake hose routing is essential to insure safe vehicle operation.***

2. Fill the brake reservoir.

**Must use DOT4 Brake Fluid**

***Note:***
**Brake fluid may damage painted surfaces or plastic parts. Always clean up spilled brake fluid immediately.**

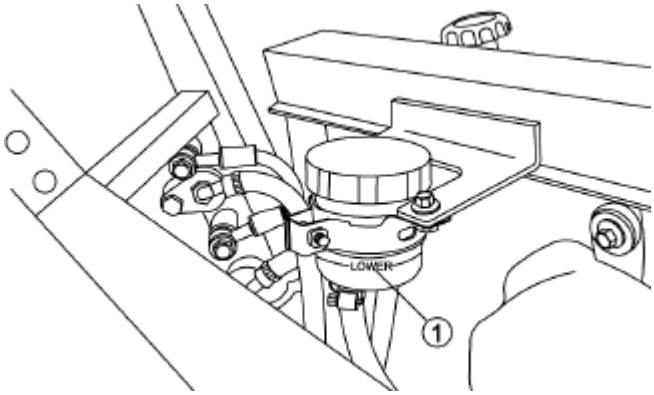
3. Air bleed the brake system

4. Check the brake fluid level. If theBrake fluid level is below the “MIN” level line Add the recommended brake fluid to the proper level.

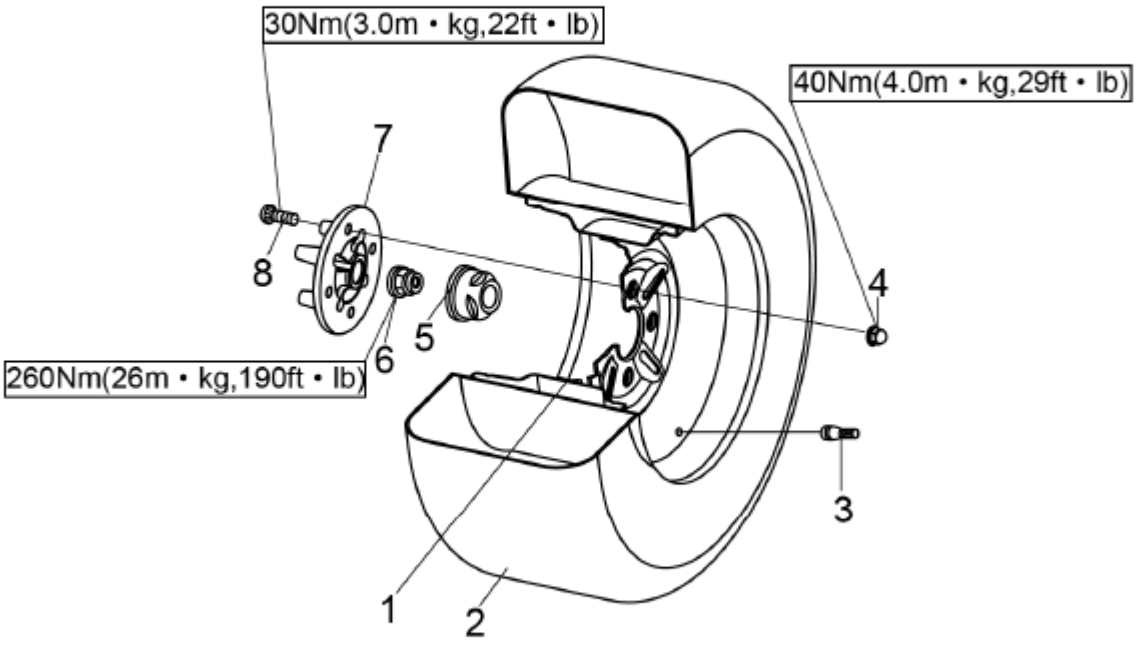
5. Adjust the parking brake cable free play.

Inspect the master cylinder for scratches or wear. Look for cracks or damage.

Inspect the Brake fluid reservoir for cracks or damage. Look at the diaphragm for cracks or damage.

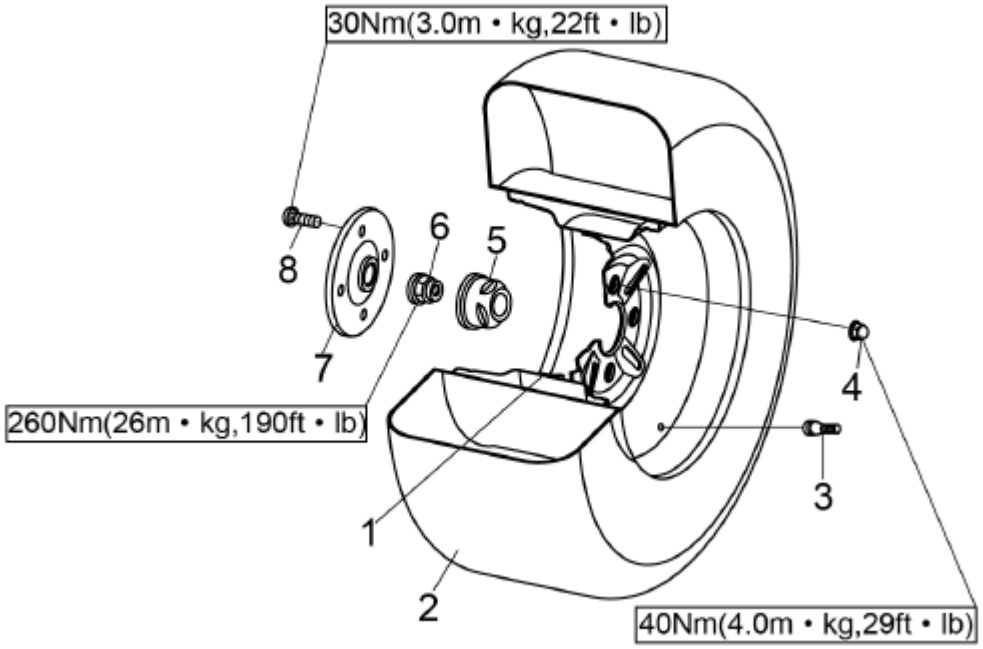


## Front Wheel




| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| | **Removing the front wheel** | | ***Warning:*** ***Securely support the vehicle so*** ***There is no danger of it falling over.*** |
| 1 | Front wheel rim | 2 | |
| 2 | Front tire | 2 | |
| 3 | Valve Stem | 2 | |
| 4 | Lug Nut M10×1.25 | 8 | |
| 5 | Center cap | 2 | |
| 6 | Hub Nut M20×1.5 | 2 | |
| 7 | Soleplate, front wheel hub | 2 | |
| 8 | Bolt | 8 | |

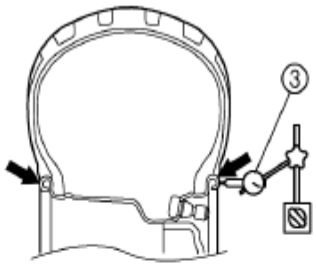
## Rear Wheels

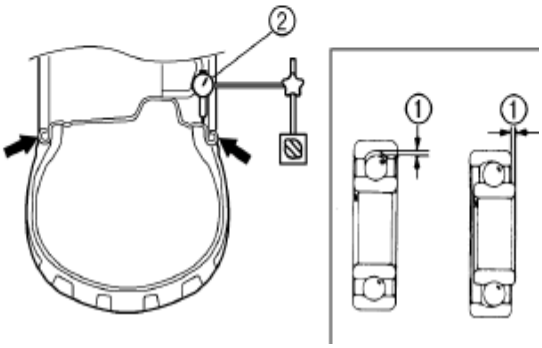



| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| | **Removing the rear wheel** | | ***Warning:*** |
| | | | ***Securely support the vehicle so*** |
| 1 | Rear wheel rim | 2 | ***There is no danger of it falling*** |
| 2 | Rear tire | 2 | ***over.*** |
| 3 | Valve stem | 2 | |
| 4 | Lug Nut M10 X 1.25 | 8 | |
| 5 | Center cap | 2 | |
| 6 | Hub Nut M20×1.5 | 2 | |
| 7 | Soleplate, rear wheel hub | 2 | |
| 8 | Bolt | 8 | |

**Inspection**

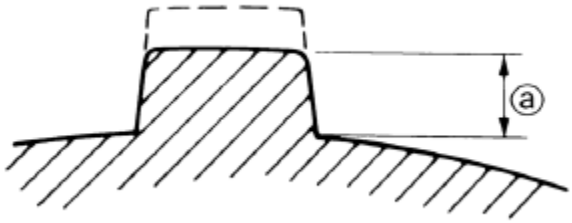
Measure the rim run out and check the balance.




**Wheel runout limit**
**Radial (2): 2.0 mm (0.08 in)**
**Lateral (3): 2.0 mm (0.08 in)**

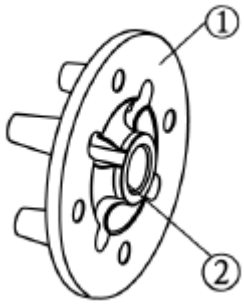
Measure the tire tread depth.



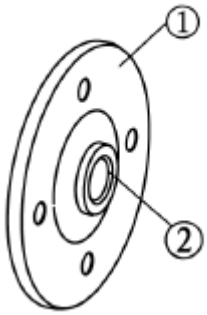

***Warning:***
***The profile depth falls below 3mm, Please replace the tire immediately.***

Inspect the wheel hub (1) for cracks or damage. Look at the splines (2) inside the hub for wear or damage. Look at the hub nut for looseness or signs of distortion.

Front

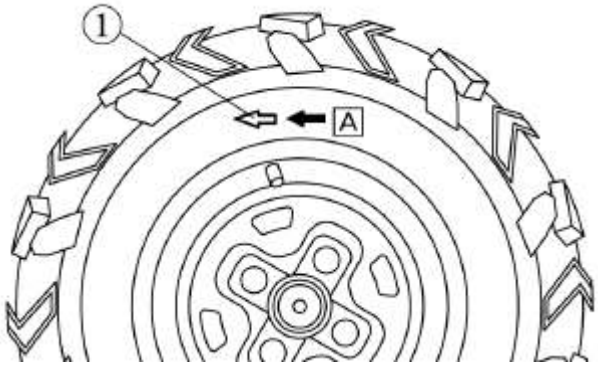



Rear




**Installation**

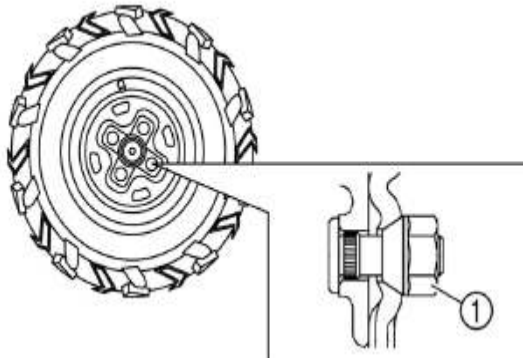
**Install the wheel with the arrow mark (1) on the tire pointing in the direction of rotation (A).**



Tighten the lug nuts.

**55 Nm or 40 ft lbs**

***Warning:***
***Tapered wheel nuts* (1) *are used for both the front and rear wheels. Install each nut with taper facing inward.***



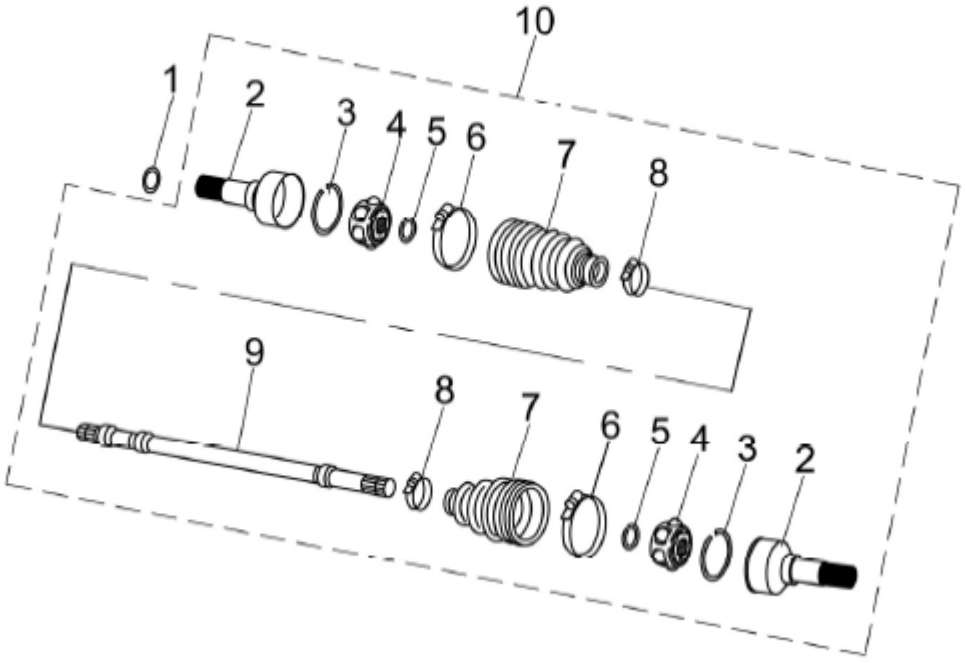

Wheel and Tire Specifications

| | Wheel hub Dimension | Tyre Dimension | Tyre Pressure (Kpa /PSI) |
|---|---|---|---|
| Front Wheel | 12×6.AT | 25×8-12 (NHS) | 70/10 |
| Rear Wheel | 12×8.AT | 25×10-12 (NHS) | 70/10 |

Since wheels and tires are crucial to the vehicle operation, inspection of tire pressure and profile depth is necessary. To ensure maximum safety and longer life expectancy of the wheel, please periodically inspect the tire pressure and profile depth. Insufficient tire pressure can result in not only intensified wearing of the tire but also instability during the course of operating the vehicle (such as hard turning). Excessive tire pressure can also reduce the friction force between the tire and ground, causing spinning or loss of control.

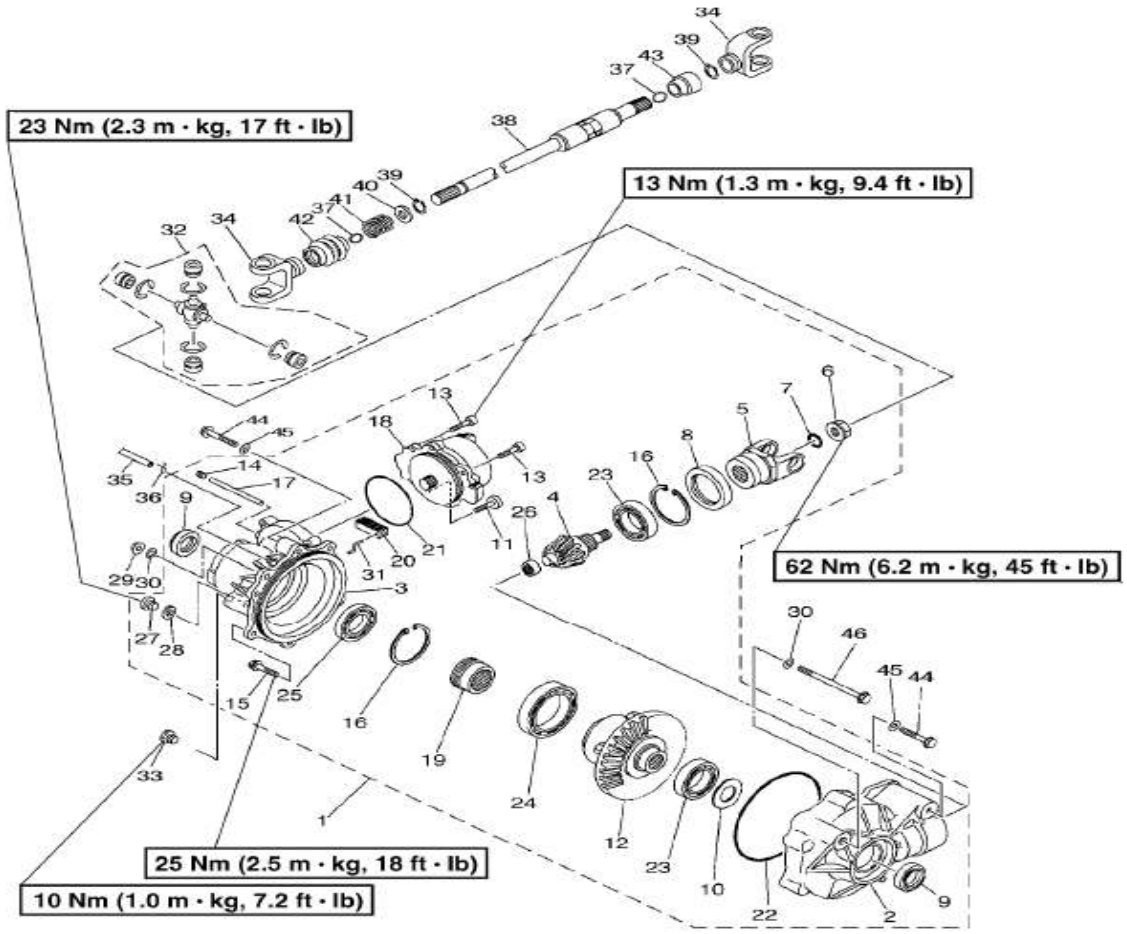
Therefore, please ensure the tire pressure strictly complies with figures shown in the chart above. Before operating the vehicle each time, please check if profile depth of the tire is over worn, which might result in spinning, instability, loss of control and other potential safety risk of the vehicle.

## Front Bridge



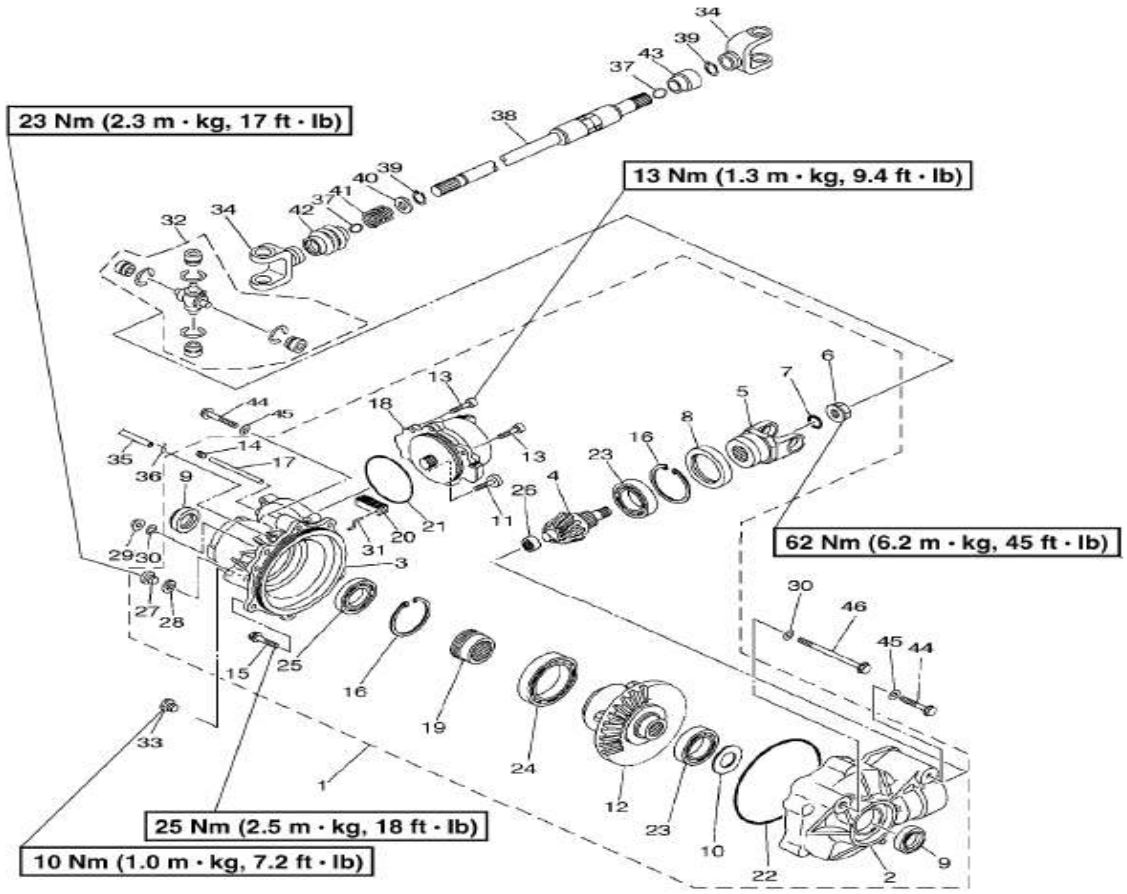

| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| | **Removing the front bridge (L.&R.)** | | |
| 1 | Circlip | 2 | |
| 2 | Double off-set joint assembly | 4 | |
| 3 | Circlip | 4 | |
| 4 | Ball bearing | 4 | |
| 5 | Circlip | 4 | |
| 6 | Boot band | 4 | |
| 7 | Dust band | 4 | |
| 8 | Boot band | 4 | |
| 9 | Joint shaft assembly | 2 | |
| 10 | C.V. Axle, front Bridge | 2 | |

## Front Bridge



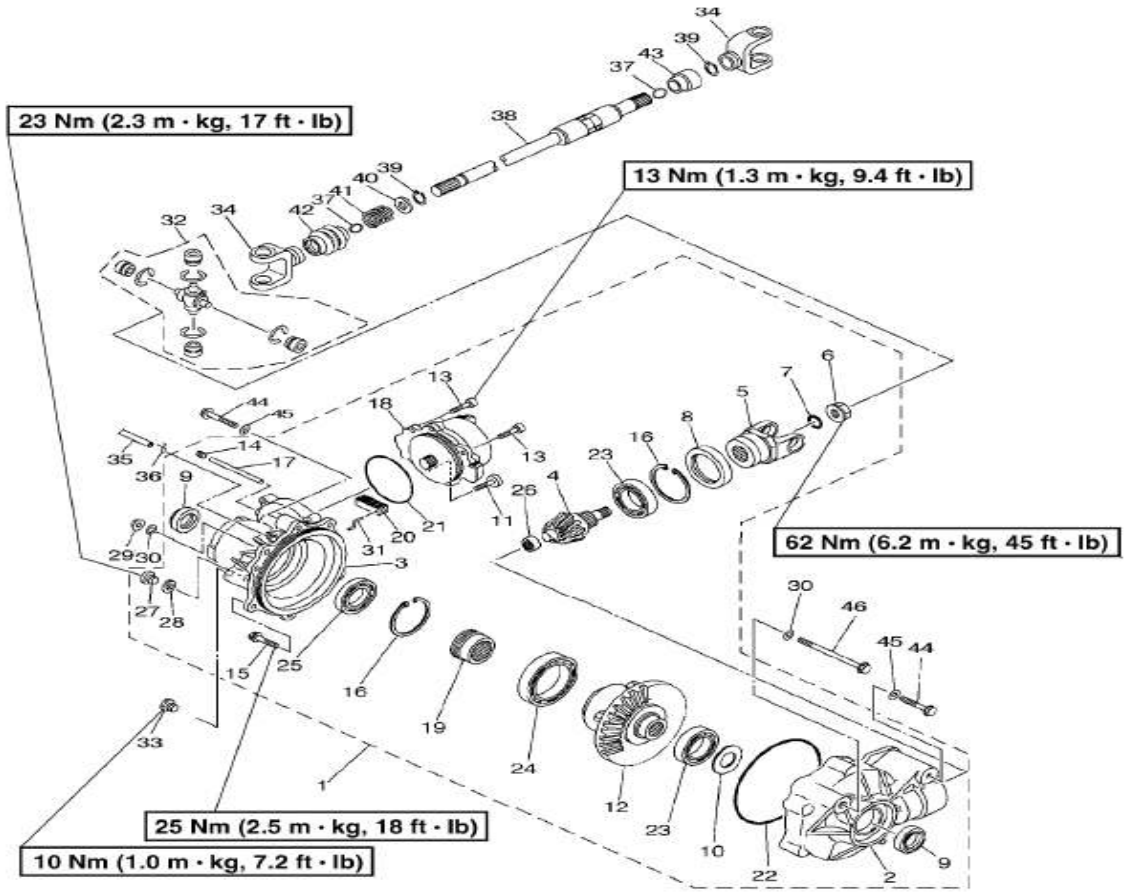

| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| | **Removing the front bridge** | | |
| 1 | Transmission shaft part, front bridge | 1 | |
| 2 | Differential gear case | 1 | |
| 3 | Differential gear case cover | 1 | |
| 4 | Drive pinion gear | 1 | |
| 5 | Universal joint yoke | 1 | |
| 6 | Nut M14×1.25 | 1 | |
| 7 | O- ring Φ14×d=Φ7 | 1 | |
| 8 | Oil seal,Φ48×Φ65×9 | 1 | |
| 9 | Oil seal, front box input shaft | 2 | |
| 10 | Shim(0.1T) | 1 | |
| 10 | Shim(0.2T) | 1 | |
| 10 | Shim(0.5T) | 1 | |

## Front Bridge




| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| 11 | Bolt M8×25 | 1 | |
| 12 | Differential gear assembly | 1 | |
| 13 | Bolt M8×25 | 1 | |
| 14 | Bolt M8×10 | 1 | |
| 15 | Oil change bolt M10×16 | 1 | |
| 16 | Circlip | 1 | |
| 17 | Column pin Φ5×80 | 1 | |
| 18 | Gear motor | 1 | |
| 19 | Coulping shaft device | 1 | |
| 20 | Rack | 1 | |
| 21 | O- ring, divide moved=Φ2×Φ81 | 1 | |
| 22 | O- ring, front box cover d=Φ2.4×Φ140 | 4 | |
| 23 | Bearing 6007 RΦ35×Φ62×14 | 1 | |
| 24 | Bearing 6912Φ60×Φ85×13 | 1 | |
| 25 | Bearing 16007 Φ35×Φ62×9 | 1 | |
| 26 | Bearing HK152112 Φ15×Φ21×12 | 1 | |
| 27 | Bolt M14×15×10 | 1 | |
| 28 | Washer Φ14×2 | 1 | |

## Front Bridge

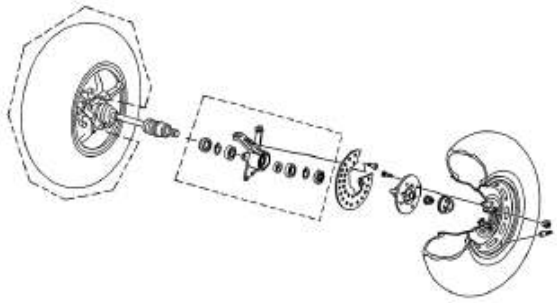



| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| 29 | Nut M10 | 1 | |
| 30 | Washer Φ10 | 2 | |
| 31 | Shaft fork 4 | 6 | |
| 32 | Universal joint | 1 | |
| 33 | Bolt M14X15 | 3 | |
| 34 | Block ring | 2 | |
| 35 | Hose Φ4.5×L=710 | 1 | |
| 36 | Clip pipe 1 | 1 | |
| 37 | Clamp | 2 | |
| 38 | Intermediate shaft | 2 | |
| 39 | Circlip | 2 | |
| 40 | Cushion piece | 1 | |
| 41 | Spring D=Φ25×Φ2.3×28 | 1 | |
| 42 | Dustproof rubber | 1 | |
| 43 | Dustproof rubber | 1 | |
| 44 | Bolt M10×25 | 1 | |
| 45 | Washer | 2 | |
| 46 | Screw | 2 | |

**Disassembly of the front bridge.**

Remove the left and right front wheels.

Remove the front disc brake clip, cotter pin, castle nut, washer and wheel hub.



Remove the left and right rocker arm and cross steering knuckle.

Remove the differential.

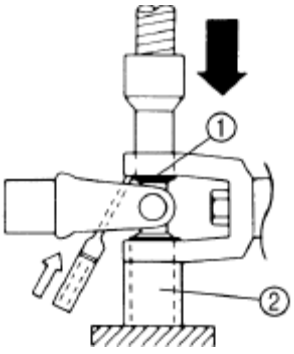
Remove the front bridge from the frame.

Remove the oil from the differential.

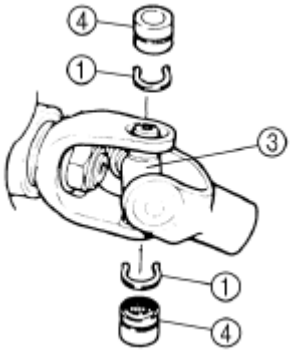
Pull the left and right transmission shafts out of the differential.

**Disassembly of the Universal Joint**

1. Remove the circlips (1).
2. Place the universal joint in a press.
3. With a suitable diameter pipe (2) beneath the yoke (3), press the bearing (4) into the pipe as shown.




4. Repeat the steps for the opposite bearing.
5. Remove the yoke.



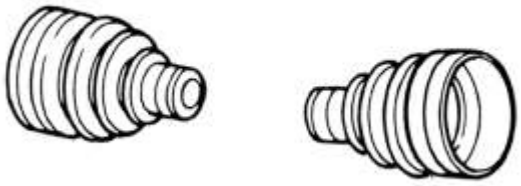

***Note:***
***It may be necessary to lightly tap the yoke with a punch.***

**REMOVING THE DIFFERENTIAL GEAR ASSEMBLY**

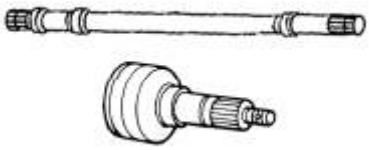
***Note:***
**The ring gear and the differential gear should be fastened together. Do not disassemble the differential gear assembly.**

**Inspection**

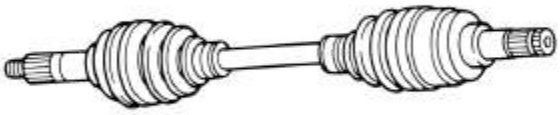
Inspect the dust boots for cracks or damage.



Inspect the double offset joint. Look at the splines of both the ball joint and the shaft for wear or damage. Look at the balls and ball races for pitting, wear or damage.



Check the movement of the left and right transmission shaft. Movement should be smooth.



If any roughness is found , disassemble the left and right transmission shaft, clean and reassemble.

***Note:***
***Do not allow the dust boot to come in contact with gas or diesel oil. Slight scratches can damage the dust boot very quickly. When assembling be sure to fill the dust boots approximately 2/3 with lithium grease.***

Inspect the differential gear. Look at the gear teeth for pitting, galling or wear. If wear is found replace the gear and ring gear as a set.

Inspect the bearings for pitting or damage.

Replace the oil seals and O-rings with new ones.

Inspect the drive shaft splines, universal joints, and the drive pinion gear splines for wear or damage.

Inspect the spring for signs of fatigue.

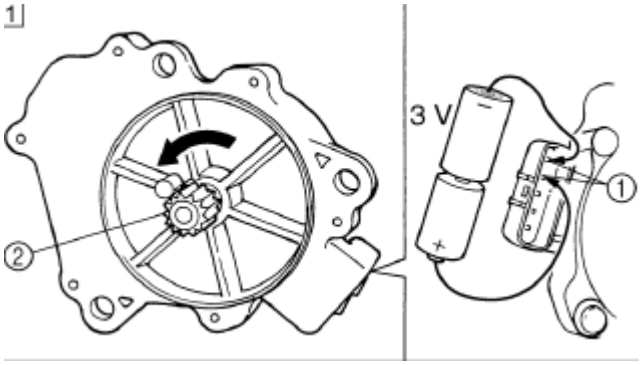
Inspect the front drive shaft for bends.

For assembly apply lithium based grease to the oil seal, front box output shaft and oil seal, front box input shaft and differential gear assembly.

Inspecting the gear motor.

Connect two C size batteries to the gear motor terminals (1).

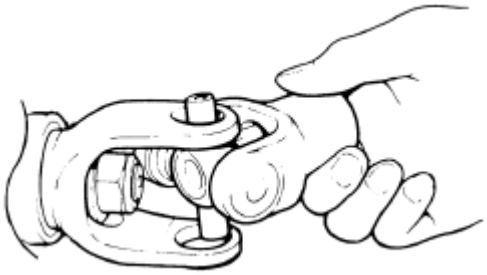
***Warning:***
***Do not use 12V battery power to operate the pinion gear.*** **Do not connect the batteries to the gear motor when it is installed in the gear case. The gear motor should be checked when it is removed from the gear case.**




Reverse the polarity of the batteries and check that the motor turns in the opposite direction (2).

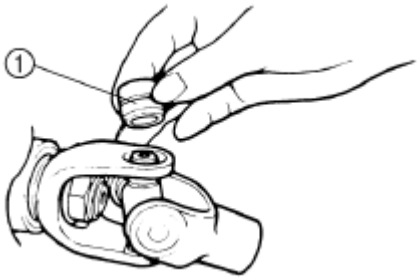
**ASSEMBLING THE UNIVERSAL JOINT**

Install the opposite yoke into the universal joint.



Apply wheel bearing grease to the bearings.

Install the bearing (1) onto the yoke.

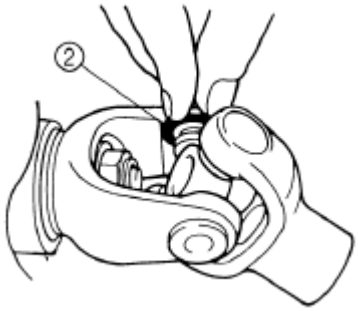



Press each bearing into the universal joint using a suitable socket.

***Caution:***
**Check each bearing. The needles can easily fall out of their races. Slide the yoke back and forth on the bearings; the yoke will not go all the way onto a bearing if a needle is out of place.**

***Note:***
***The bearing must be inserted far enough into the universal joint so that the circlip can be installed.***

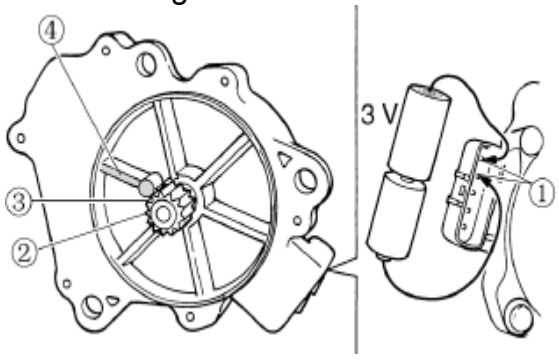
Install the circlips (2) into the groove of each bearing.




**ASSEMBLING THE DIFFERENTIAL GEAR**

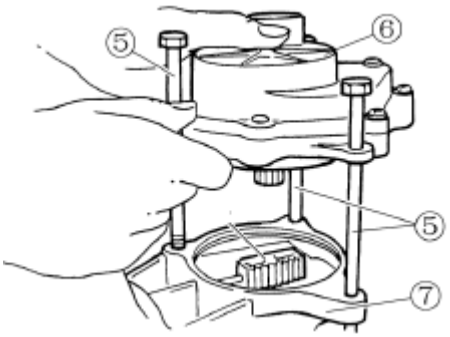
1. Measure the gear lash

2. Install the gear motor
   - Installed to the differential gear, to the right to put it into the 2WD mode.
   - Connect two C size batteries to the gear motor terminal (1) to operate the pinion gear (2). Operate the pinion gear until the paint mark (3) on the gear is aligned with the paint mark (4) on the gear motor case.




***Caution:***
***Do not use a 12 V battery to operate the pinion gear.***

- Insert bolts (5) into the gear motor (6) and use them as a guide to set the motor on the differential gear assembly (7) so that the shift fork sliding gear (8) does not move.




***Caution:***
***If the position of the shift fork sliding gear is moved, the position of the differential gear and the indicator light display may differ, and the 2WD or differential lock mode may not be activated.***

- Remove the bolts, and then install the motor with the gear motor bolts.

**INSTALLING THE FRONT BRIDGE PARTS**

Put the left and right transmission shaft in the front bridge differential.

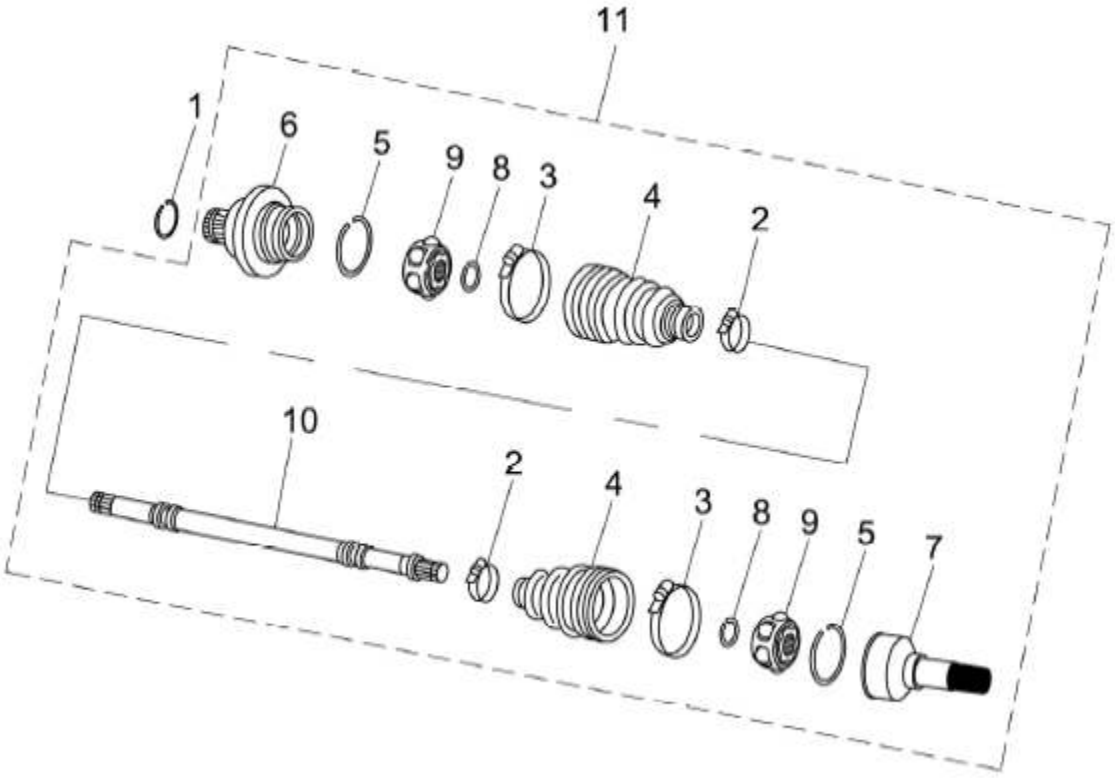
Pour 0.32L SAE 80 API GL-4 the high quality gear oil into the front bridge differential and tighten the oil filler bolt.

**Fastening Torque of Conical Nut**
**23 Nm (2.3m · kg,17 ft · lb)**

Install the front bridge differential onto the frame with two hexagon bolts M10×110,two nuts M10 and two flat gaskets.

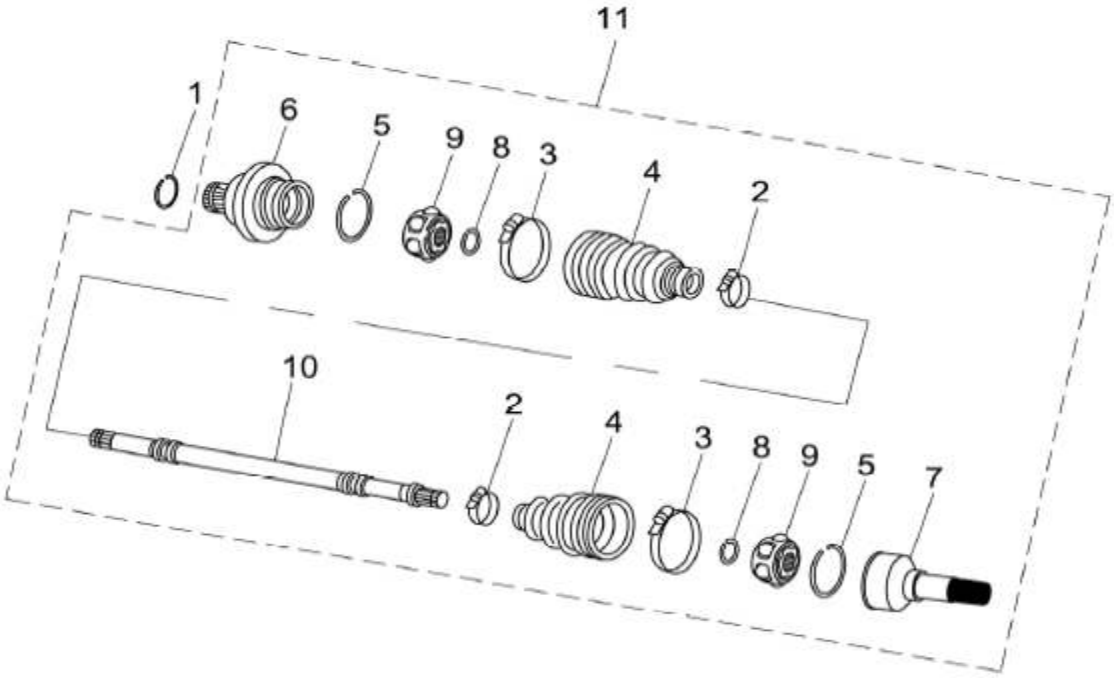
**Fastening Torque of the Bolt**
**40 - 45 Nm 4.0 - 4.5 m · kg,29 - 33 ft · lb**

## Rear Bridge



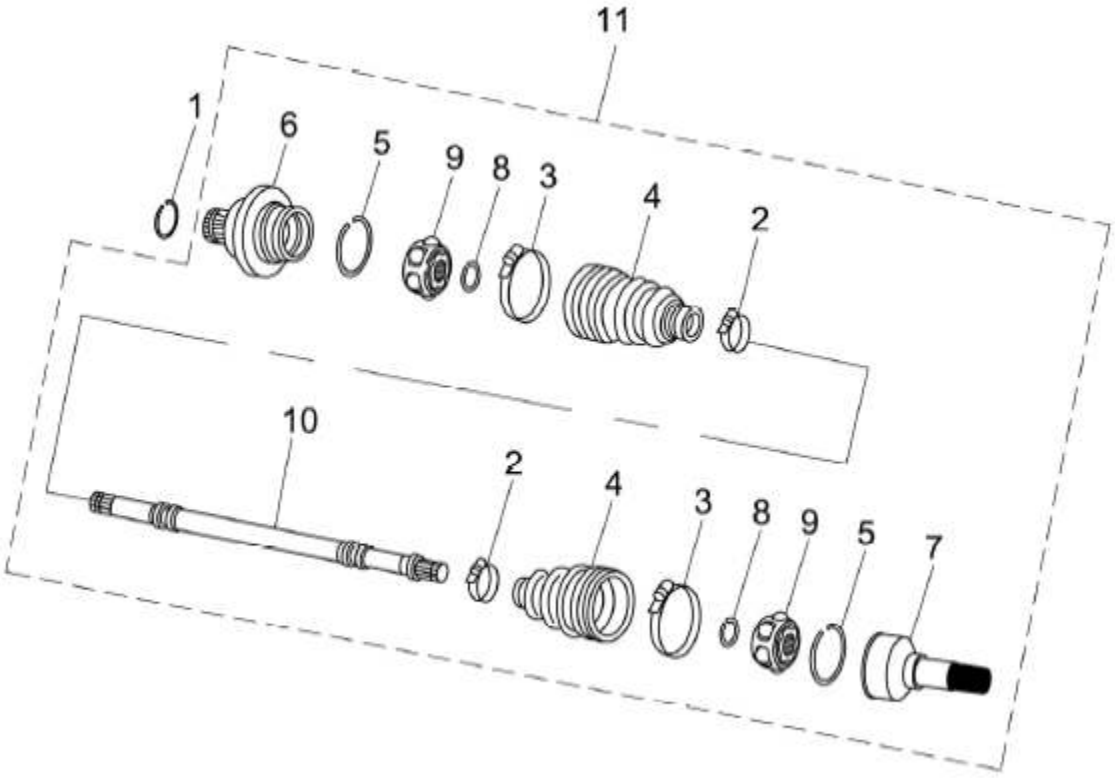

| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| | **Removing the rear bridge(L.&R.)** | | |
| 1 | Circlip | 2 | |
| 2 | Boot band | 4 | |
| 3 | Boot band | 4 | |
| 4 | Dust band | 4 | |
| 5 | Circlip | 4 | |
| 6 | Double off-set joint assembly | 2 | |
| 7 | Double off-set joint assembly | 2 | |
| 8 | Circlip | 4 | |
| 9 | Ball bearing | 4 | |
| 10 | Joint shaft assembly | 2 | |
| 11 | C.V. Axle, rear bridge | 2 | |
| 12 | Nut M12×1.25 | 1 | |
| 13 | Housing, pinion bearing | 1 | |
| 14 | Rear adjustment gasket I (0.1T) | 1 | |

## Rear Bridge



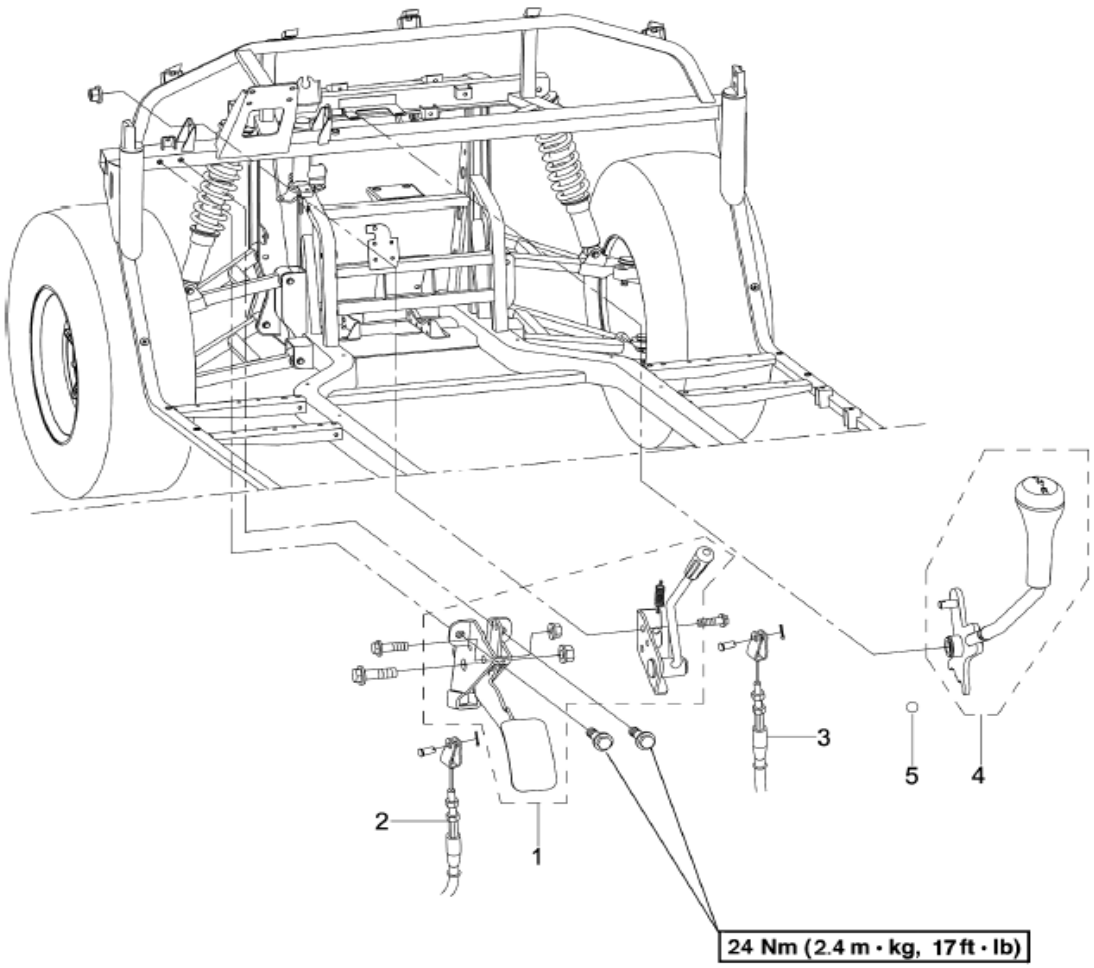

| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| 14 | Rear adjustment gasket I(0.2T) | 1 | |
| 14 | Rear adjustment gasket I(0.5T) | 1 | |
| 15 | Rear adjustment gasket II | 1 | |
| 16 | Sensor, speed | 1 | |
| 17 | O-ring Φ19.4×Φ2.3 | 1 | |
| 18 | Bolt M8×35 | 4 | |
| 19 | Washer, plate Φ8 | 4 | |
| 20 | Bolt M8×25 | 6 | |
| 21 | Washer, plate Φ8 | 6 | |
| 22 | Zinc alloy flowing bean | 1 | |
| 23 | Housing, bearing | 1 | |
| 24 | Ring gear stopper | 1 | |
| 25 | Washer, plate | 1 | |
| 26 | Nut, flange M8 | 1 | |
| 27 | Bolt, flange M8×12 | 1 | |
| 28 | Washer, plate Φ15×Φ8.2×1 | 1 | |
| 29 | Oil seal Φ65×Φ90×9 | 2 | |
| 30 | Bearing 16017Φ85×Φ130×14 | 1 | |
| 31 | O-ring Φ3.1×Φ150 | 1 | |

## Rear Bridge



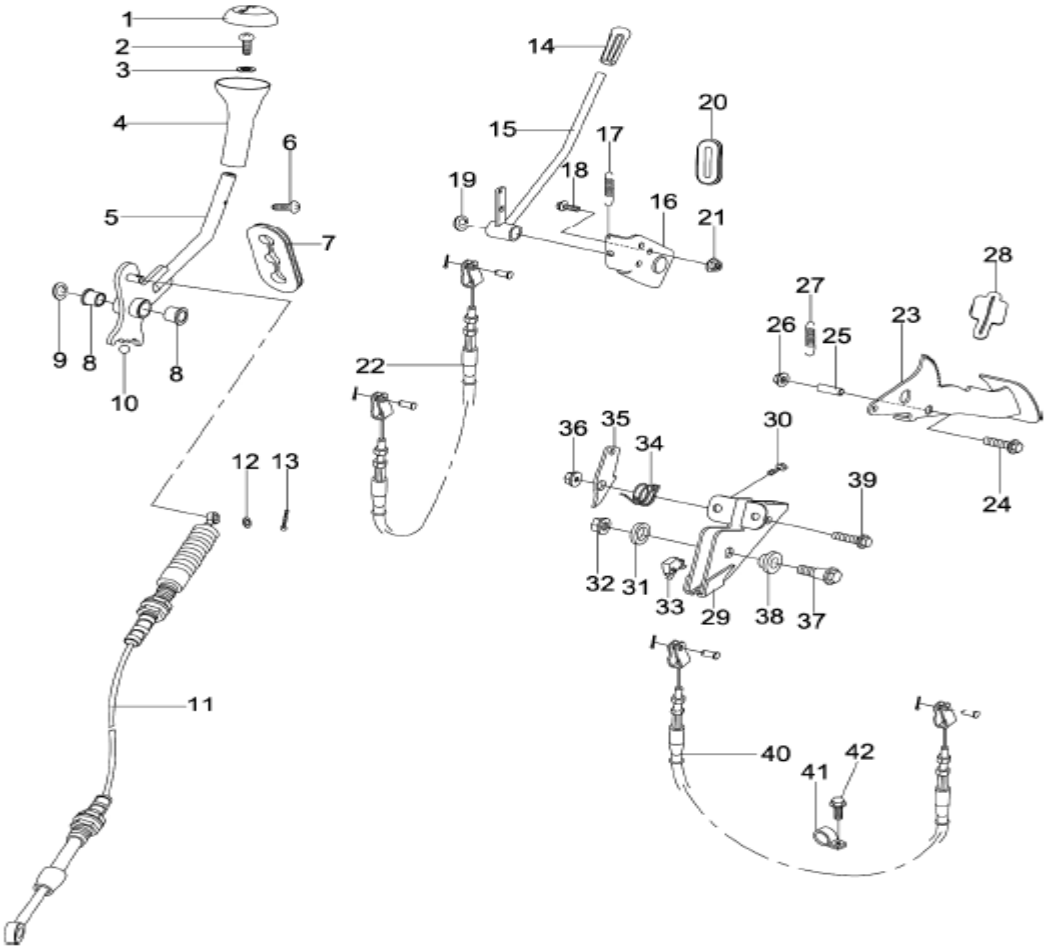

| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| 32 | Rear adjustment gasket III (0.1T) | 1 | |
| 32 | Rear adjustment gasket III (0.2T) | 1 | |
| 33 | Bolt, flange | 2 | |
| 34 | Plug, straight screw | 1 | |
| 35 | Gasket Φ14×1.5 | 1 | |
| 36 | Spring, compression Φ14×Φ1.8×46 | 1 | |
| 37 | Shaft, drive | 1 | |
| 38 | Circlip Φ17.5×1 | 1 | |
| 39 | Coupling | 1 | |
| 40 | Circlip | 1 | |
| 41 | Front dust cover Φ46×Φ23.5×35 | 1 | |
| 42 | Rear dust cover Φ40.7×Φ19×30 | 1 | |
| 43 | Clip | 1 | |
| 44 | Hose Φ4.5×800 | 1 | |
| 45 | Driven gear | 1 | |

## Gearshift, Parking Brake



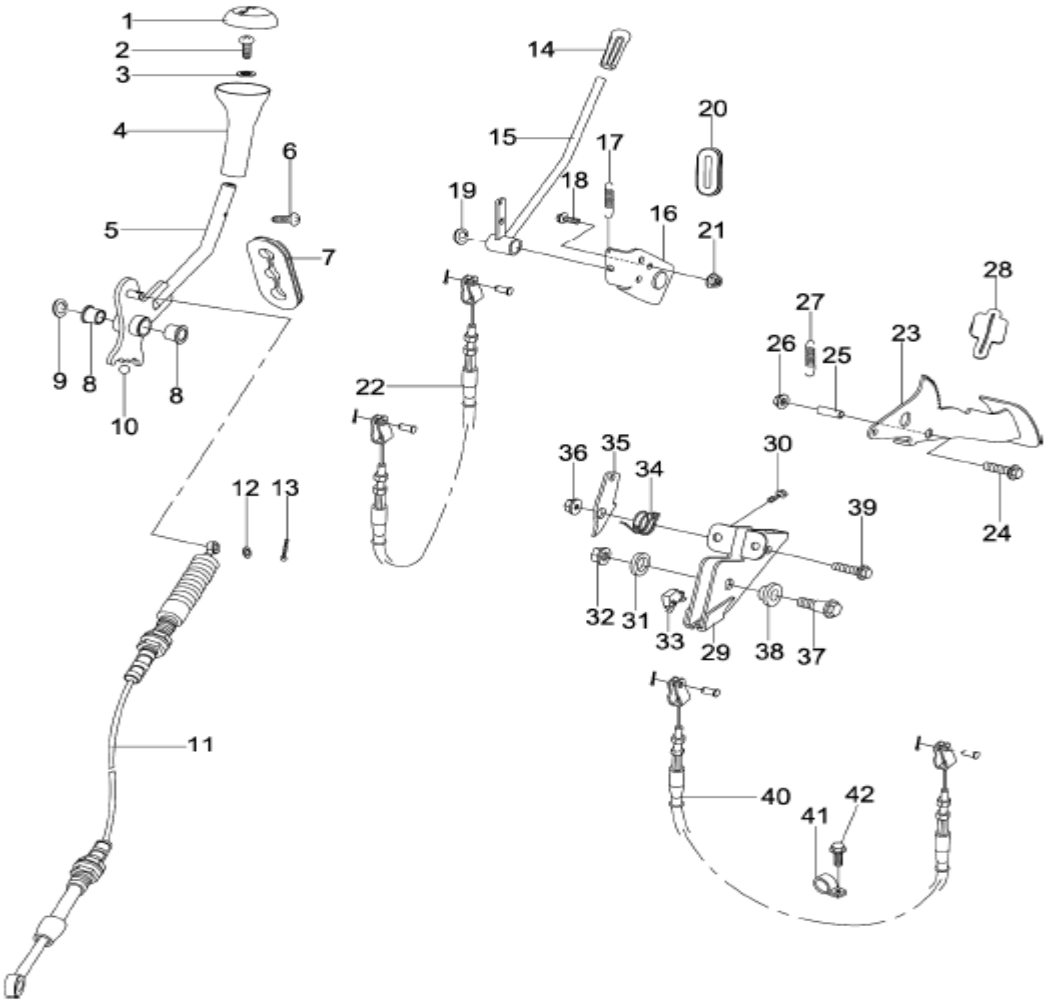

| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| 1 | Parking system | 1 | |
| 2 | Parking Cable Assembly | 1 | |
| 3 | Parking Return cable | 1 | |
| 4 | Gearshift component | 1 | |
| 5 | Steel ball Φ9.5 | 1 | |

## Gearshift and Parking system Components



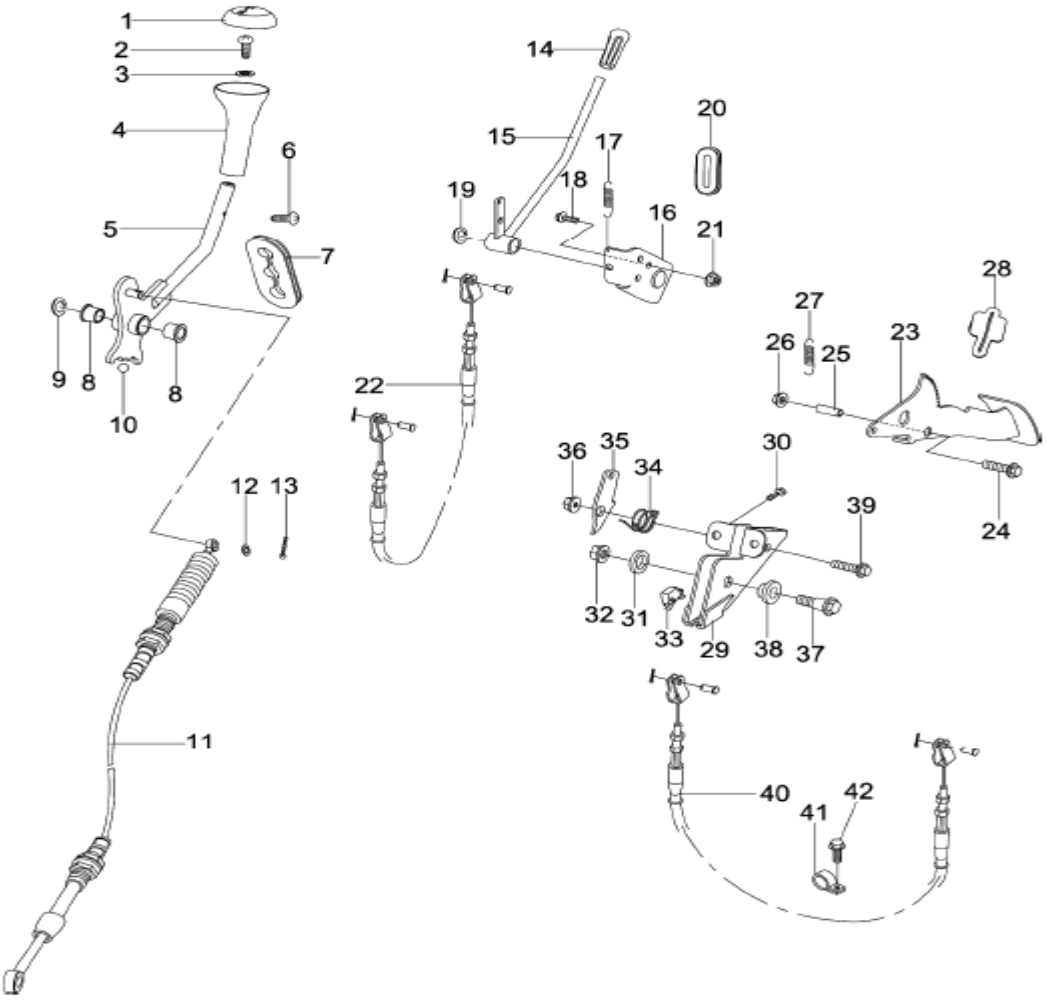

| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| 1 | Handle cover | 1 | |
| 2 | Screw M6×12 | 1 | |
| 3 | Washer Φ6 | 1 | |
| 4 | Handle sheath | 1 | |
| 5 | Gearshift rod | 1 | |
| 6 | Screw M4×8 | 1 | |
| 7 | Dust sleeve, Gearshift | 1 | |
| 8 | Burring bush | 2 | |
| 9 | Split Washer Φ12 | 1 | |
| 10 | Steel ball Φ9.5 | 2 | |
| 11 | Gearshift cable assembly | 1 | |
| 12 | Washer Φ8 | 1 | |
| 13 | Cotter pin φ3.5×20 | 1 | |
| 14 | Locked handle sheath, Handrail | 1 | |
| 15 | Parking Return Switch | 1 | |

## Gearshift and Parking system Components




| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| 16 | Mounting Feet, Return Switch | 1 | |
| 17 | Return spring, Parking handle | 1 | |
| 18 | Hex Flange Bolt M6×12 | 2 | |
| 19 | Split Washer Φ13 | 1 | |
| 20 | Dust sleeve, Parking Return Switch | 1 | |
| 21 | Hex Flange Self-locked Nut M6 | 1 | |
| 22 | Parking Cable Assembly | 1 | |
| 23 | Parking Pedal | 1 | |
| 24 | Hex Flange Bolt M8×35 | 1 | |
| 25 | Bush Φ12×Φ8.5×20 | 1 | |
| 26 | Hex Flange Self-locked Nut M6 | 1 | |
| 27 | Return Spring, Parking Pedal | 1 | |
| 28 | Dust sleeve, Parking Pedal | 1 | |

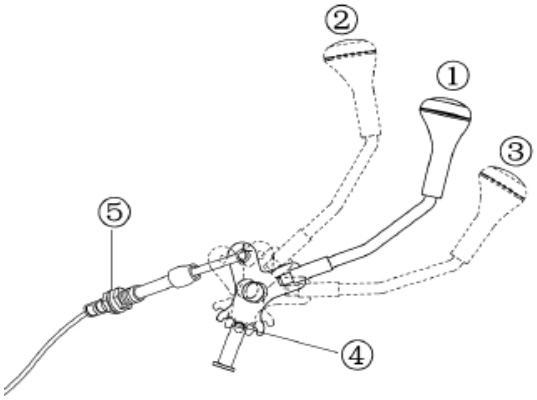
## Gearshift and Parking system Components




| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| 29 | Mounting Plate, Parking Pedal | 1 | |
| 30 | Hex Flange Bolt M8×25 | 1 | |
| 31 | Spacing Bush I, Parking Pin | 1 | |
| 32 | Hex Flange Nut M8 | 1 | |
| 33 | Parking sensor | 1 | |
| 34 | Parking Torsion Spring | 1 | |
| 35 | parking lock plate | 1 | |
| 36 | Hex Flange Nut M8 | 1 | |
| 37 | Hex Flange Bolt M8×30 | 1 | |
| 38 | Spacing Bush II, Parking Pin | 1 | |
| 39 | Hex Flange Bolt M8×35 | 1 | |
| 40 | Parking Cable Assembly | 1 | |
| 41 | Fixing Clip, Parking Cable | 1 | |
| 42 | Hex Flange Bolt M6×20 | 1 | |

## Adjusting the Gear shift lever

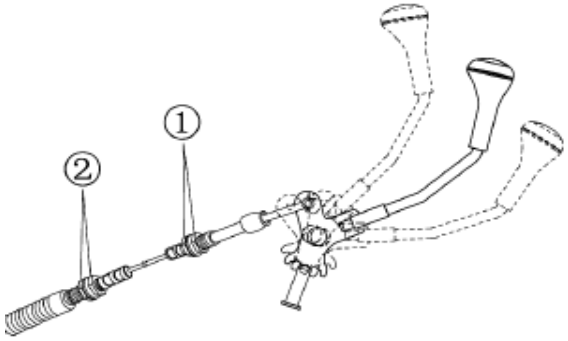
(1) Forward
(2) Neutral
(3) Reverse
(4) Steel ball Φ9.5
(5) Select lever shift rod




***Note:***
***Before shifting, you must stop the vehicle and take your foot off the accelerator pedal.***
***Otherwise, the transmission may be damaged.***

1. Make sure the select lever is in NEUTRAL.
2. Loosen both nuts (1).
3. Adjust the shift rod length for smooth and correct shifting.
4. Tighten the nuts (2).

**Nut**
**15 Nm (1.5 m · kg, 11 ft · lb)**




**Checking and Servicing of the reverse mechanism.**

1. Check the mobility of gear shift handle. If it is not working properly, remove the gear shift mechanism to check if the fork , ball or spring is stuck, in which case replace the defective component and try again.

2. If there is slack in the gear shift mechanism , adjust the nut of the fork to correct position to stiffen the gear shift mechanism.

3. Remove the gear shift mechanism and check whether the linking rod is cracked; If so, it should be changed.

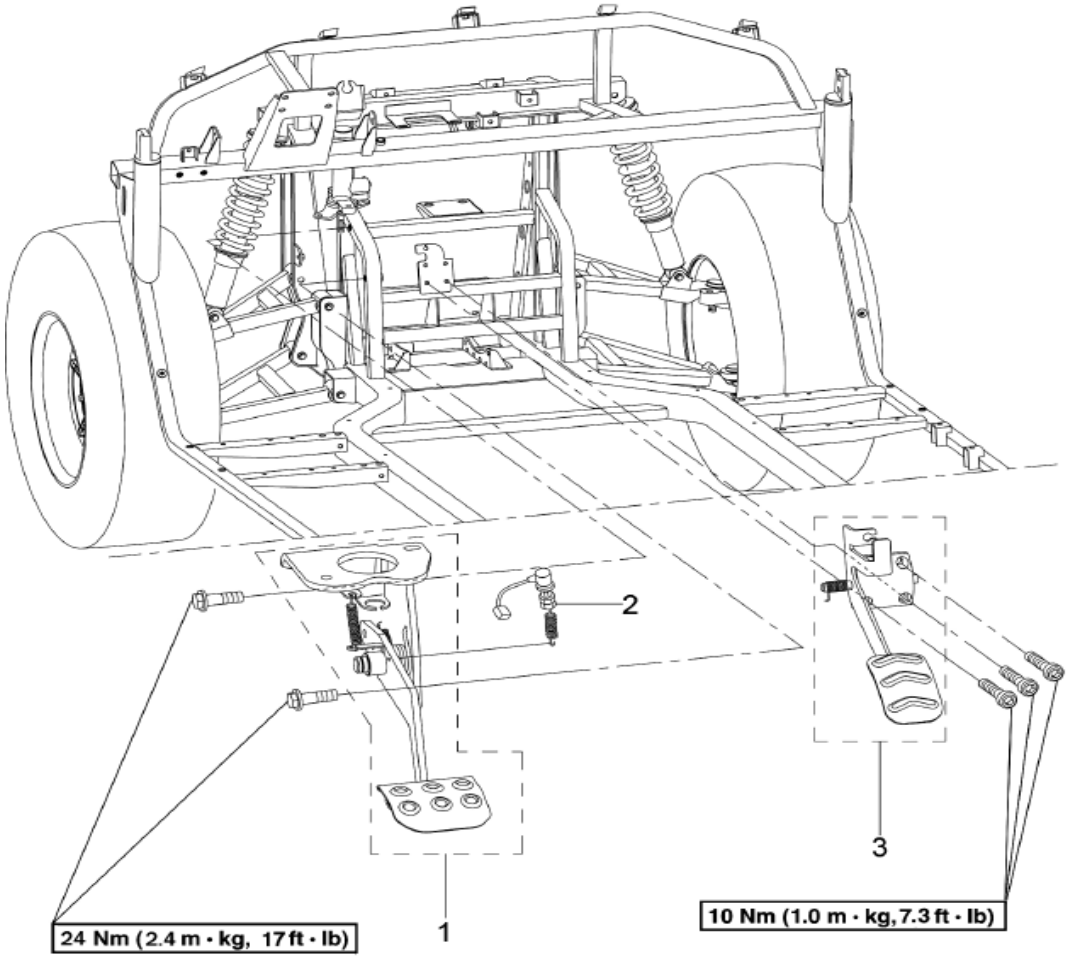
4. Check whether the bouncing spring of gear shift mechanism is strong enough.

5. Check whether the gear is engaged correctly and whether it stops short of the desired position or has slack.

6. If the gear can not be engaged, test it from the following aspects:

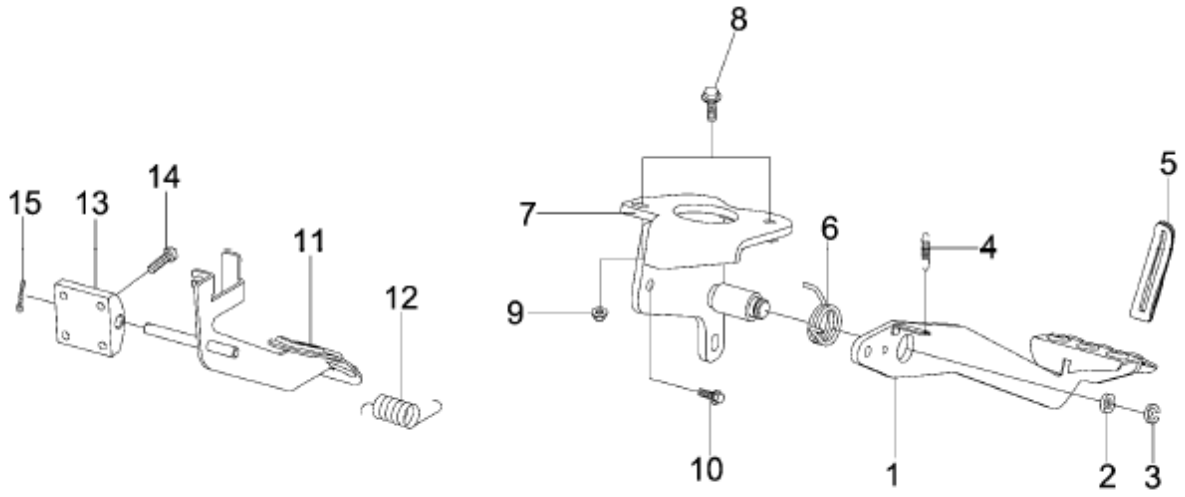
- Does the clutch can completely disengage?
- Is the gearshift lubricated properly? (is the oil line of gear shift mechanism blocked);
- Is the gear shift mechanism jammed?

## Pedal Assembly



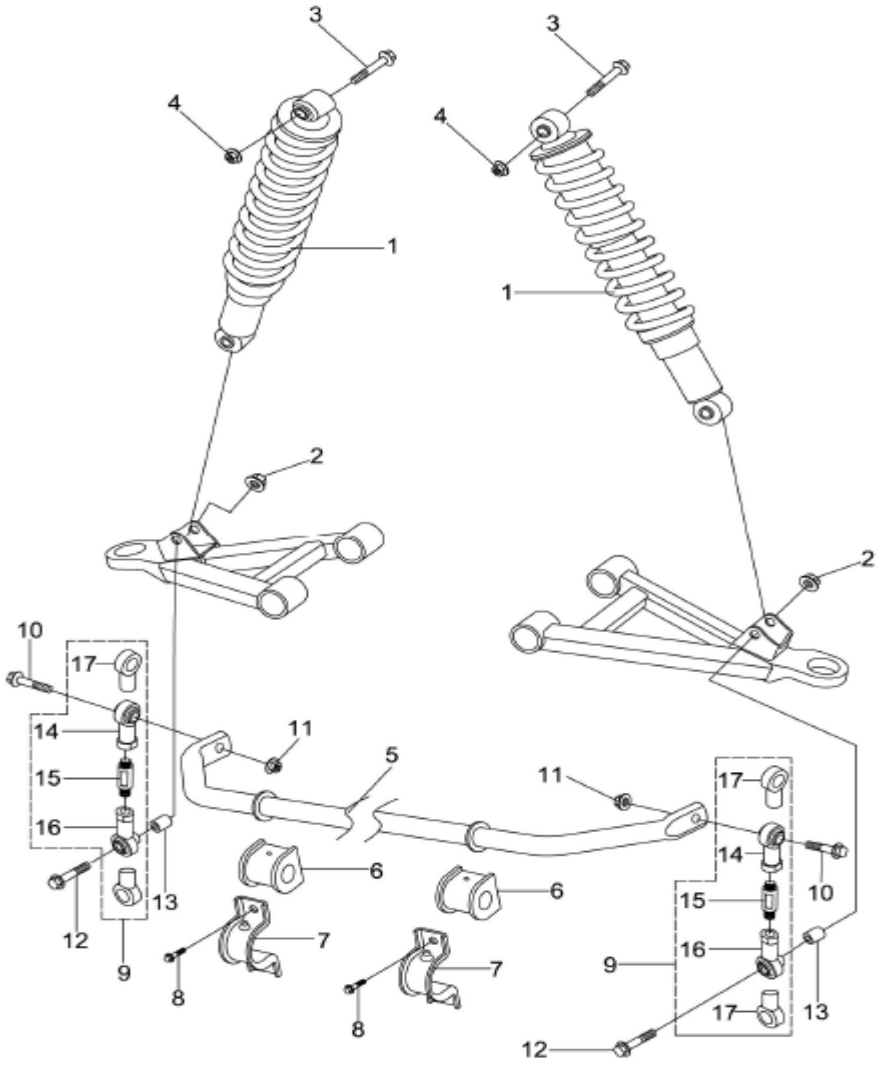

| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| 1 | Rear brake pedal assembly | 1 | |
| 2 | Ignition Switch assembly | 1 | |
| 3 | Accelerator pedal assembly | 1 | |

## Brake Pedal Assembly



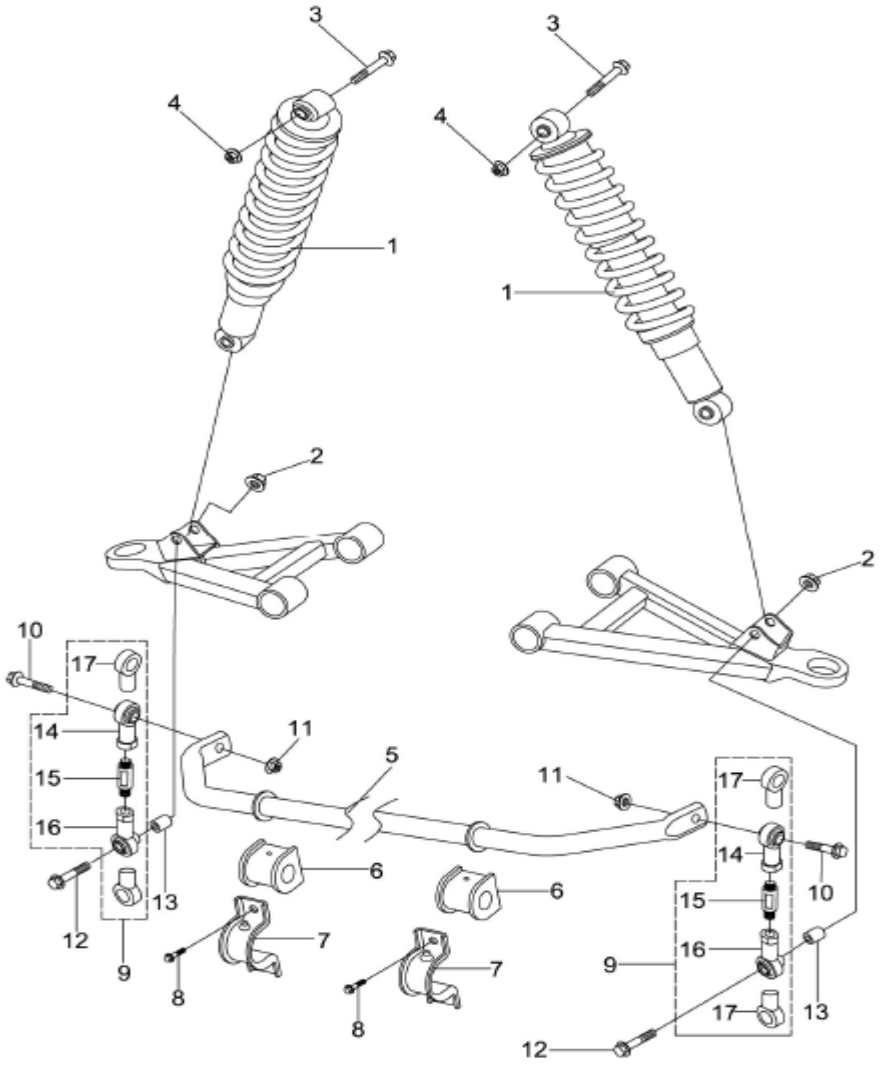

| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| 1 | Rear brake pedal | 1 | |
| 2 | Washer Φ15 | 1 | |
| 3 | Split Washer Φ13 | 1 | |
| 4 | Return spring, rear brake pedal | 1 | |
| 5 | Dust sleeve, Braking Pedal | 1 | |
| 6 | Return spring, rear brake pedal | 1 | |
| 7 | Rear brake pump bracket assembly | 1 | |
| 8 | Hex Flange Bolt M8×20 | 1 | |
| 9 | Hex Flange Self-locked Nut M8 | 1 | |
| 10 | Hex Flange Bolt M8×16 | 1 | |
| 11 | Accelerator pedal assembly | 1 | |
| 12 | Return Spring, Accelerator Pedal | 1 | |
| 13 | Mounting seat assembly, Accelerator Pedal | 1 | |
| 14 | Hexagon socket head bolt M6×16 | 1 | |
| 15 | Cotter pin Φ3.5×20 | 1 | |

## Front Suspension



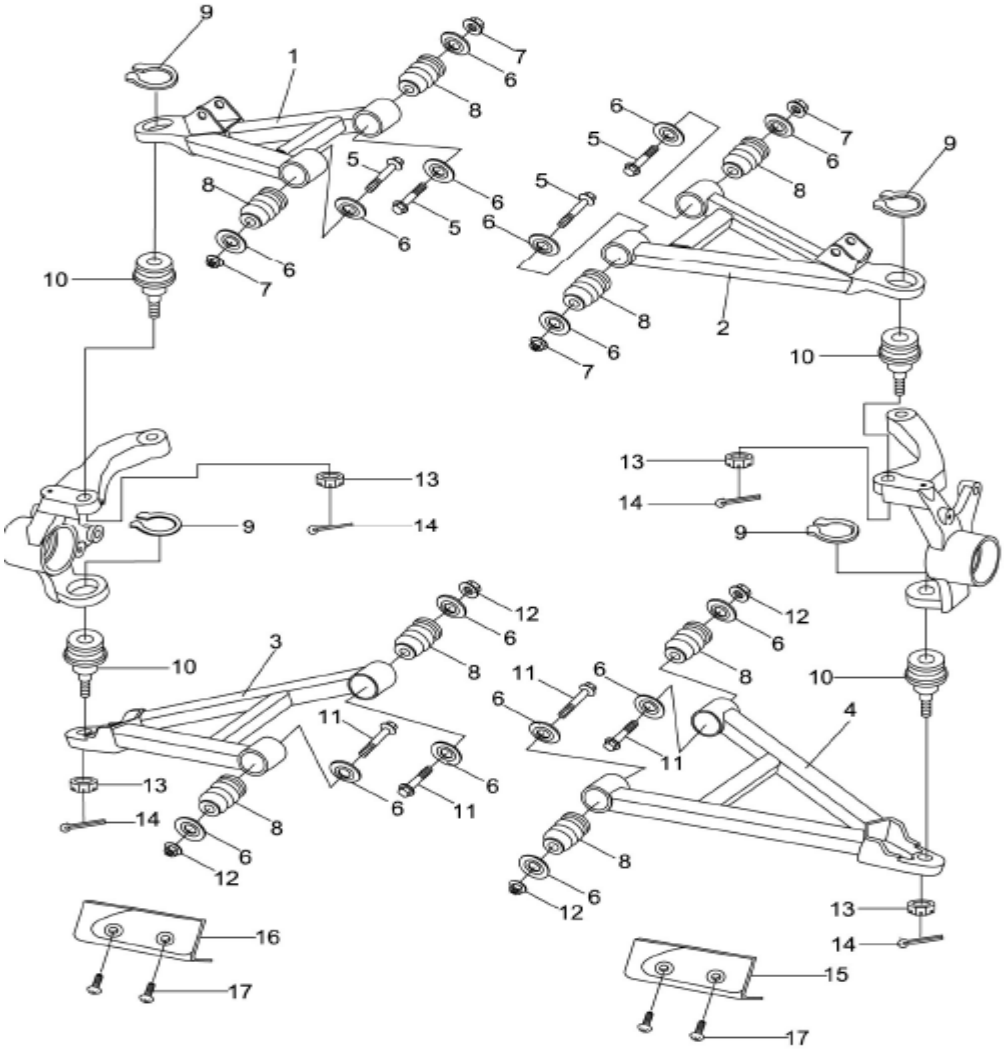

| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| 1 | Shock Absorber Canister (Black) | 2 | |
| 2 | Hex Flange Self-locked Nut M10×1.25 | 2 | |
| 3 | Hex Flange Bolt M10×1.25×52 | 2 | |
| 4 | Hex Flange Self-locked Nut M10×1.25 | 2 | |
| 5 | Front Anti-roller Lever Assembly | 1 | |
| 6 | Shock Absorber Rubber, Anti-roller Lever | 2 | |
| 7 | Press Board, Anti-roller Lever | 2 | |
| 8 | Six-Angle Flange Bolt M8×16 | 4 | |
| 9 | Tie Rod, Anti-roller Lever | 2 | |
| 10 | Hex Flange Bolt M10×1.25×45 | 2 | |

## Front Suspension



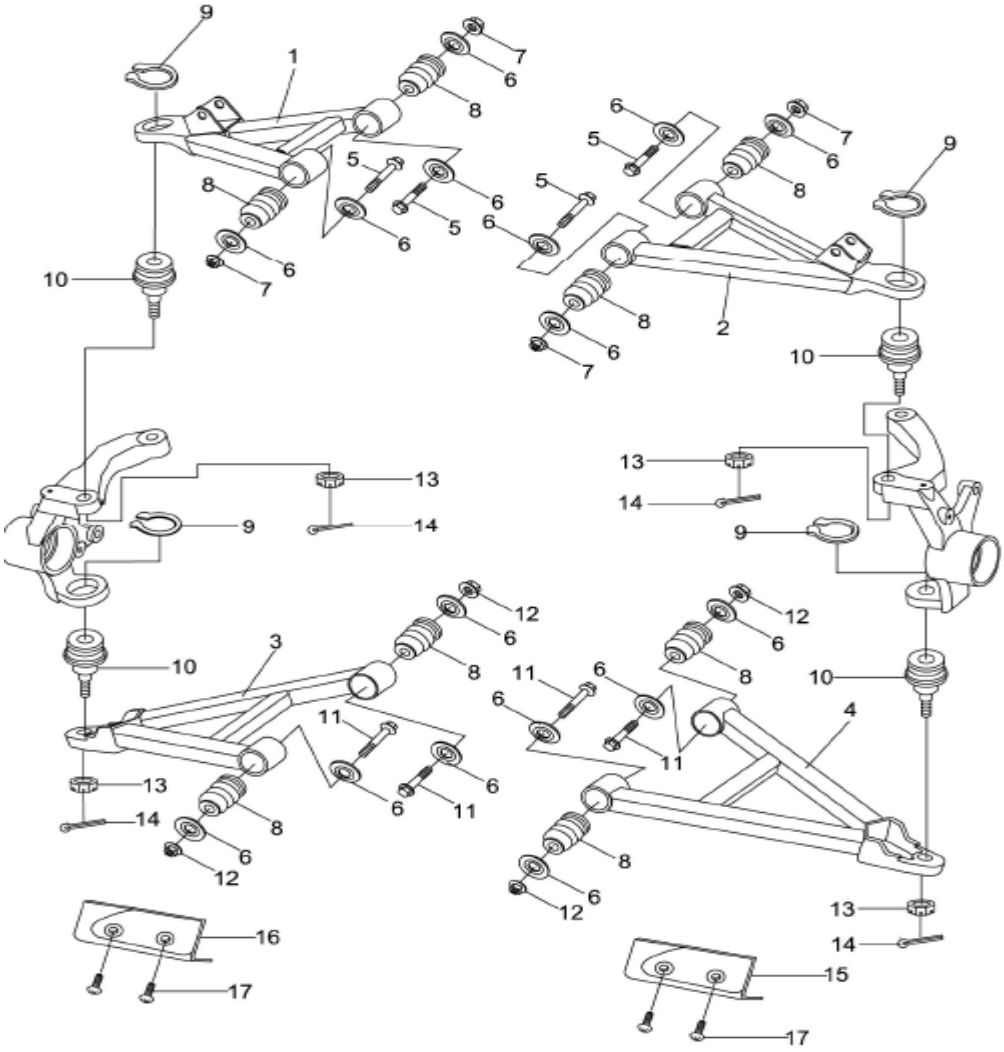

| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| 11 | Hex Flange Self-locked Nut M10×1.25 | 2 | |
| 12 | Hex Flange Bolt M10×1.25×95 | 2 | |
| 13 | Tie Rod Collar, Anti-roller Lever | 2 | |
| 14 | Ball Joint Assembly 1 (Left Rotation) | 2 | |
| 15 | Tie rod, Front Balance Lever | 2 | |
| 16 | Ball Joint Assembly 1 (Right Rotation) | 2 | |
| 17 | Ball Joint Sleeve(Balance Lever) | 4 | |

## Front Arm



| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| 1 | Front Upper Right Swing Arm | 1 | |
| 2 | Front Upper Left Swing Arm | 1 | |
| 3 | Front Lower Right Swing Arm | 1 | |
| 4 | Front Lower Left Swing Arm | 1 | |
| 5 | Hex Flange Bolt M10×1.25×70 | 4 | |
| 6 | Washer, Swing Arm | 16 | |
| 7 | Six-Angle Flange Self-locked Nut M10×1.25 | 4 | |
| 8 | Middle Rubber Tube, Swing Arm | 8 | |
| 9 | Circlip D=30 | 4 | |
| 10 | Front Ball Joint Assembly | 4 | |

## Front Arm




| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| 11 | Hex Flange Bolt M10×1.25×70 | 4 | |
| 12 | Hex Flange Self-locked Nut M10×1.25 | 4 | |
| 13 | Hex Flange Nut M10×1.25 | 4 | |
| 14 | Cotter pin Φ3.5×20 | 4 | |
| 15 | Left Front Lower Rocker Protection Board | 1 | |
| 16 | Right Front Lower Rocker Protection Board | 1 | |
| 17 | Cross tape head Bolt M6×12 | 4 | |

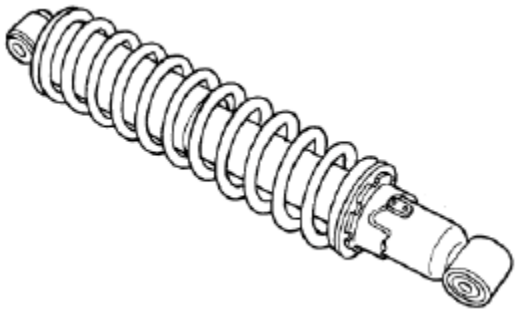
**Inspection**

1. When disassembling and servicing the suspension components look for apparent problems with bushings, cotter pins and shock absorbers.

2. If the left or right side has excessive bounce or rocking while driving, check the bushings on the A arms. Look for crushed or aging, cracked condition. Inspect the ball joints for pitting damage and free play.

3. Inspect the cotter pins, in place and holding.

4. Check the shock absorbers for ability to return to their original position. Inspect the shock springs for breaks or cracks. Look for bends, damage or leaks of fluid from the shocks.



**Installation**

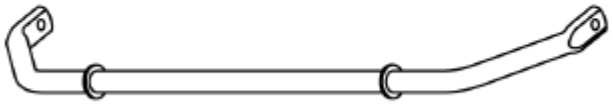
1. Install the bushing into the A- Arms and mount the a-arms onto the frame with flange bolts M10 X70 and M10 nuts and torque to specification.

   **40 – 45 Nm or 29 – 32 ft lbs**

***Caution:***
***These components should be greased with lithium based grease before installation. Be sure there are no cracks in rubber components before installation.***

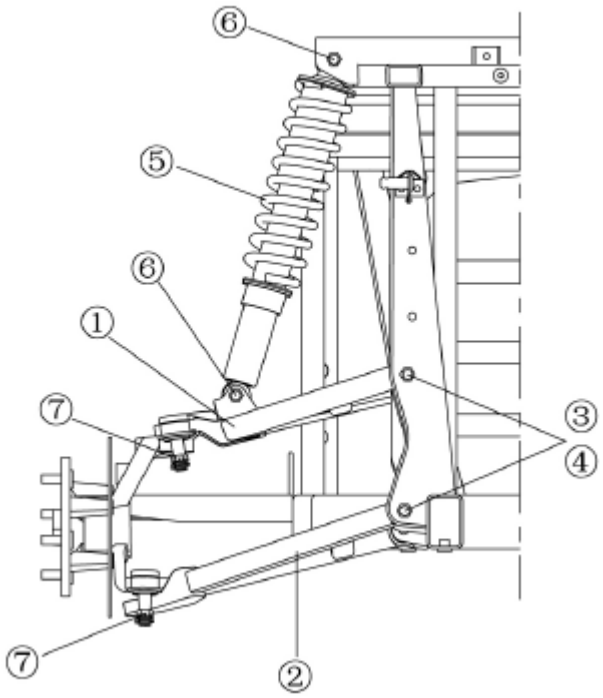
2. Attach the tension rods with castle nuts and cotter pins.

Inspect the stabilizer bar for bends, cracks or damage.



Inspect the steering knuckles for pitting or damage.

**Installation of the front arms and shock absorbers**




Install the front upper arm (1) and the front lower arm (2). Lubricate the bolts (3) with lithium based grease and position them so that the bolt head faces outward. Temporarily tighten the nuts (4).

Install the shock absorbers (5) and tighten nut (6).

**Nut (6)**
**45 Nm (4.5 m · kg, 32 ft · lb)**

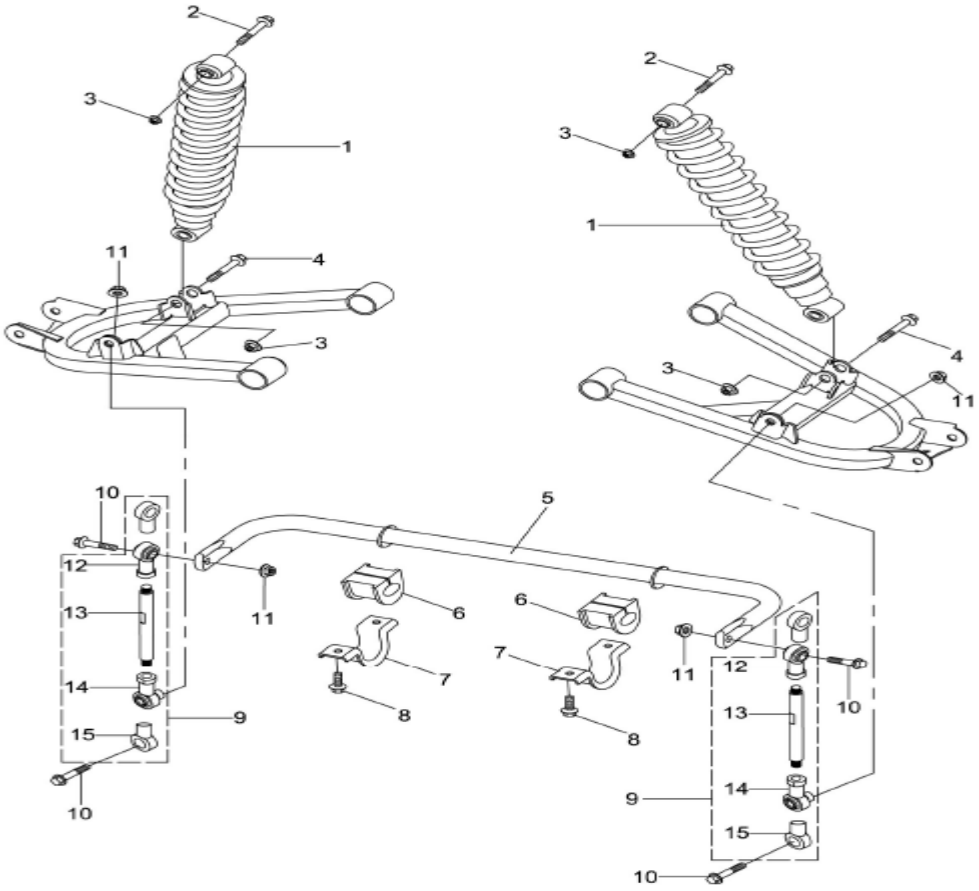
Install the ball joints and tighten nut (7).

**Nut (7)**
**30 Nm (3.0 m · kg, 22 ft · lb)**

Install new cotter pins and tighten nut (4).

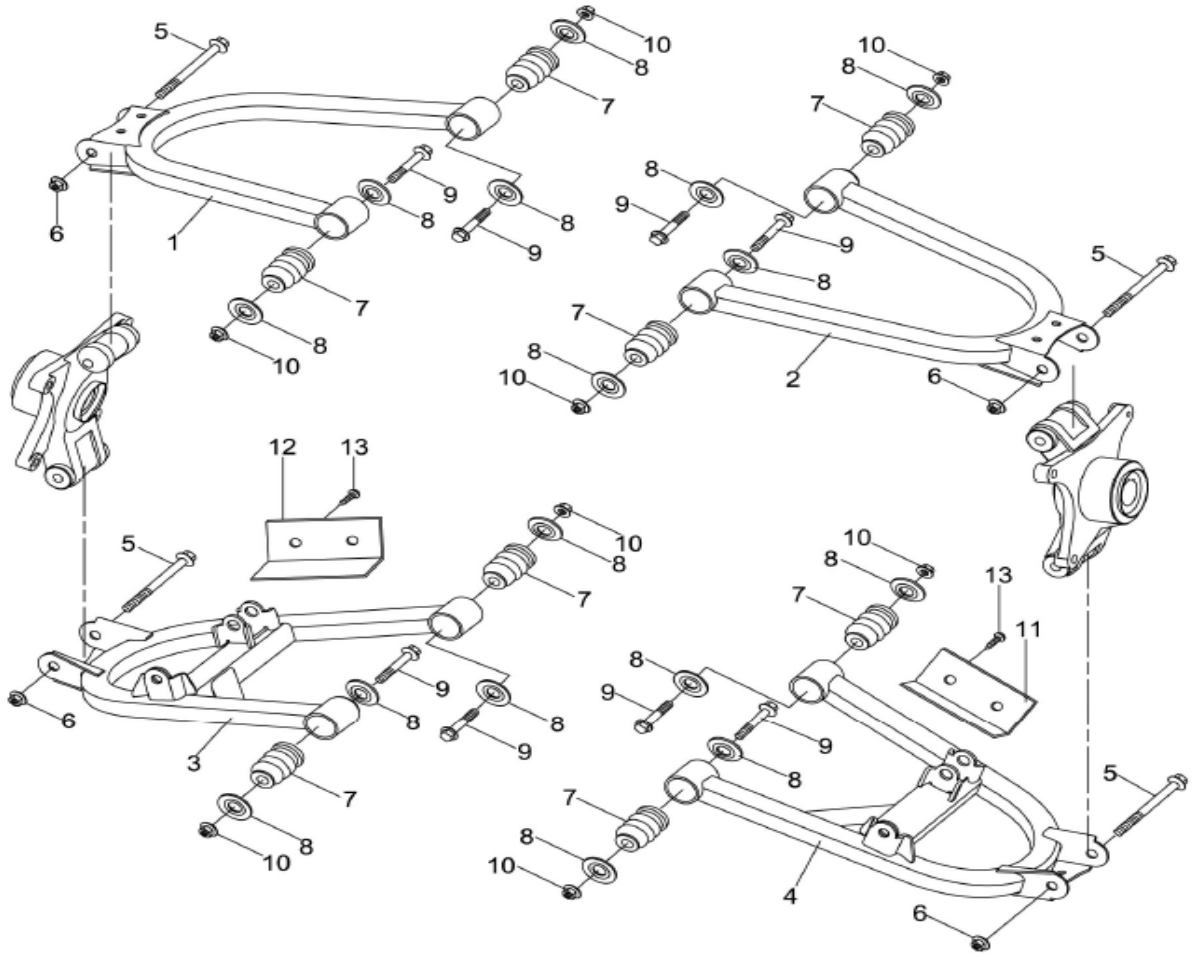
**Nut (4)**
**45 Nm (4.5 m · kg, 32 ft · lb)**

## Rear Suspension




| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| 1 | Shock Absorber Canister (Black) | 2 | |
| 2 | Hex Flange Bolt M12×1.25×70 | 2 | |
| 3 | Hex Flange Self-locked Nut M12×1.25 | 4 | |
| 4 | Hex Flange Bolt M12×1.25×65 | 2 | |
| 5 | Rear Anti-roller Lever Assembly | 1 | |
| 6 | Shock Absorber Rubber, Anti-roller Lever | 2 | |
| 7 | Press Board, Anti-roller Lever | 2 | |
| 8 | Hex Flange Bolt M8×16 | 4 | |
| 9 | Tie rod assembly, Balance Lever | 2 | |
| 10 | Flange bolt | 4 | |
| 11 | Flange nut | 4 | |
| 12 | Tie rod sleeve, upper | 2 | |
| 13 | Tie rod, Rear Balance Lever | 2 | |
| 14 | Ball Joint Assembly 1 (Right Rotation) | 2 | |
| 15 | Ball Joint Sleeve(Balance Lever) | 2 | |

## Rear Swing Arm Assembly




| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| 1 | Rear Right Upper Swing Arm | 1 | |
| 2 | Rear Left Upper Swing Arm | 1 | |
| 3 | Rear Right Lower Swing Arm | 1 | |
| 4 | Rear Left Lower Swing Arm | 1 | |
| 5 | Hex Flange Bolt M10×1.25×105 | 4 | |
| 6 | Hex Flange Self-locked Nut M10×1.25 | 4 | |
| 7 | Middle Rubber Tube, Swing Arm | 8 | |
| 8 | Washer, Swing Arm | 16 | |
| 9 | Hex Flange Bolt M10×1.25×70 | 8 | |
| 10 | Hex Flange Self-locked Nut M10×1.25 | 8 | |
| 11 | Rear left lower swing arm cover | 1 | |
| 12 | Rear right lower swing arm cover | 1 | |
| 13 | Phillips head Bolt M6×12 | 4 | |

**Inspection**

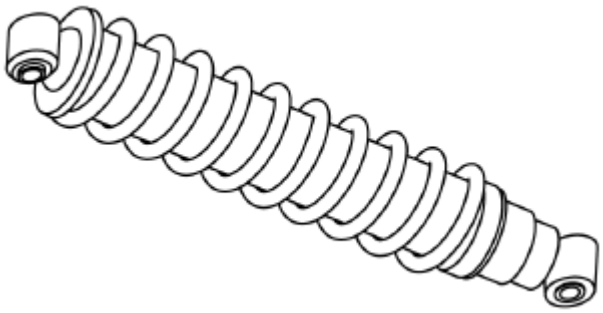
The rear suspension components are checked in the same manner as the front. Refer back to the front inspection.

Inspect the stabilizer for bends, cracks or damage.

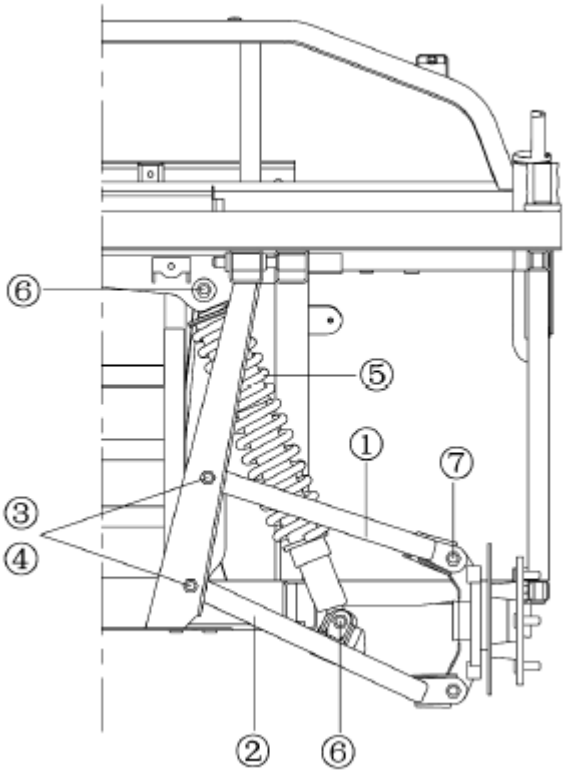
Inspect the steering knuckles for pitting or damage.

Inspect the rear arms for bends or damage. Look at the middle bushing for wear or damage.

Inspect the shock absorber rods for bends or damage. Look for oil leaks. Check the spring for fatigue.



**Installation**




Install the rear upper arm (1) and rear lower arm (2). Lubricate bolts (3) with lithium based grease and install them positioned so that the bolt head faces outward. Temporarily hand tighten nuts (4).

Install the shock absorbers (5) and tighten Nut (6).

**Nut (6)**
**45 Nm (4.5 m · kg, 32 ft · lb)**

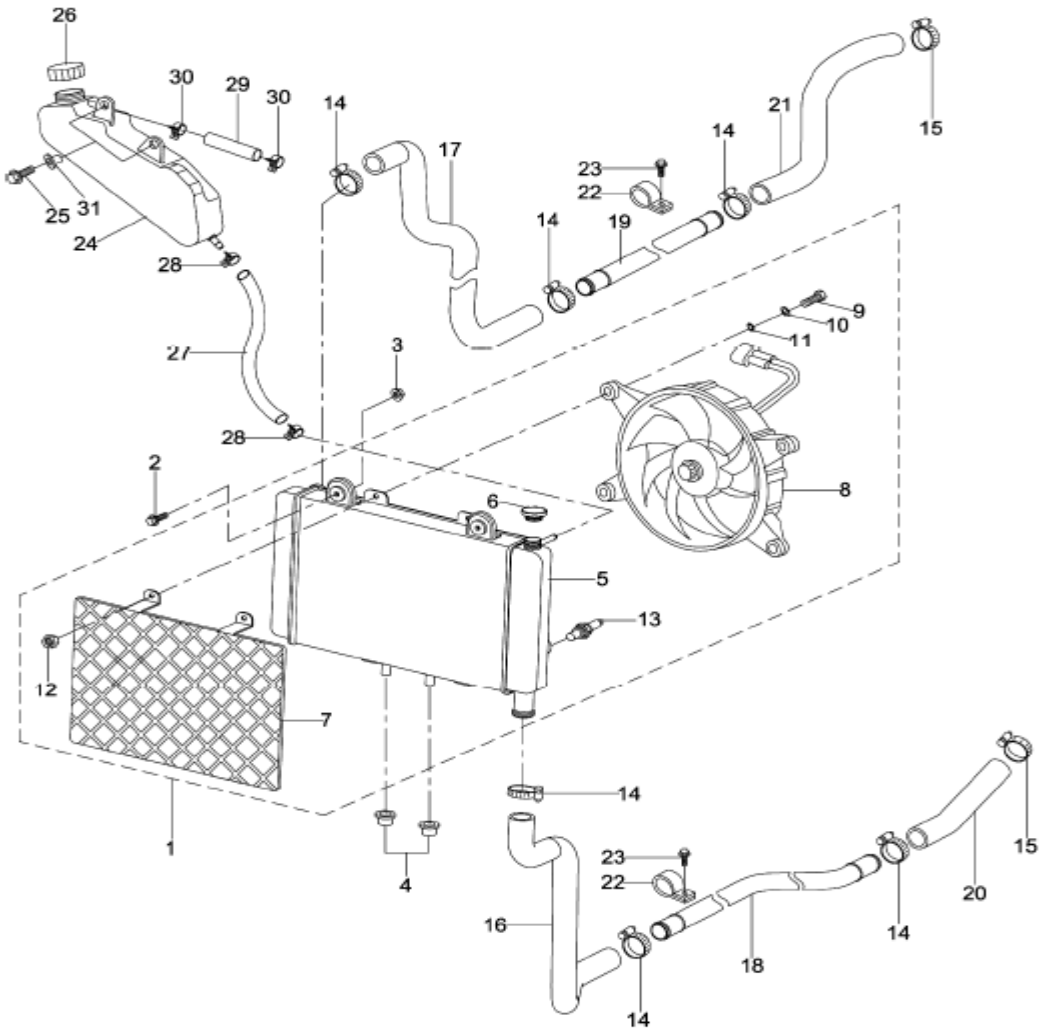
Install the rear knuckle and tighten nut (7).

**Nut (7)**
**45 Nm (4.5 m · kg, 32 ft · lb)**

Now go back and tighten nut (4).

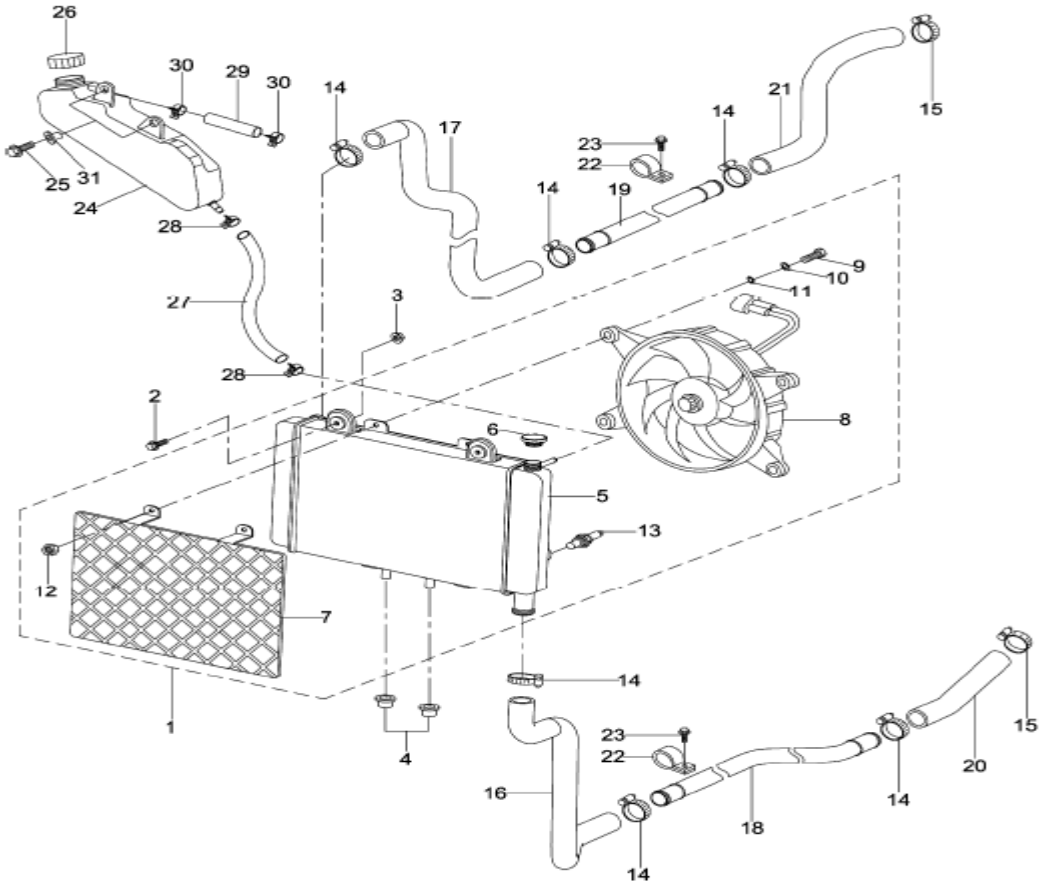
**Nut (4)**
**45 Nm (4.5 m · kg,32 ft · lb)**

## Cooling System




| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| 1 | Radiator and fan assembly | 2 | |
| 2 | Hex Flange Bolt M6×16 | 2 | |
| 3 | Hex Flange Nut M6 | 1 | |
| 4 | Rubber Cushion | 6 | |
| 5 | Radiator | 2 | |
| 6 | Radiator Cap | 1 | |
| 7 | Radiator guard | 1 | |
| 8 | Fan Assembly | 1 | |
| 9 | Bolt M6×20 | 1 | |
| 10 | Washer Φ6 | 1 | |
| 11 | Spring washer Φ6 | 1 | |
| 12 | Flange Nut M6 | 1 | |
| 13 | Temperature Sensor | 1 | |
| 14 | Pipe Clip Φ20-Φ30 | 2 | |

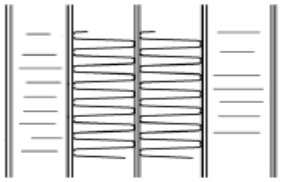
## Cooling System




| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| 15 | Pipe Clip Φ14-Φ25 | | |
| 16 | Left Front Rubber Pipe(Water Inlet) | | |
| 17 | Right Front Rubber Pipe(Water Inlet) | | |
| 18 | Left Metal Pipe | | |
| 19 | Right Metal Pipe | | |
| 20 | Left Rear Rubber Pipe( Engine) | | |
| 21 | Right Rear Rubber Pipe( Engine) | | |
| 22 | Pipe Clip(Rubber covered) | | |
| 23 | Six-Angle Flange Bolt M6×12 | | |
| 24 | Standby Water Bottle | | |
| 25 | Six-Angle Flange Bolt M6×16 | | |
| 26 | Standby Water Tank Cover Assy | | |
| 27 | Connection Rubber Pipe Φ5×Φ9×360,Standby Water Tank | | |
| 28 | Clip Φ9 | | |
| 29 | Overflow Pipe Φ5×Φ9×320 | | |
| 30 | Clip Φ11 | | |

**Inspection**

Inspect the radiator fins for obstructions. Use compressed air to the rear to blow out any debris.



***Note:***
***Carefully straighten any flattened fins with a thin, flat- head screwdriver.***

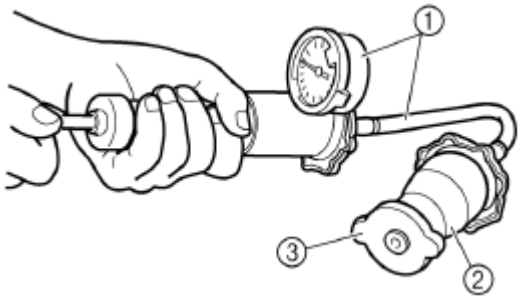
Inspect all rubber hoses for cracks or damage. Inspect the hose clamps for looseness.

Inspect the fan for operation and any damage.

Measure the radiator cap for opening pressure.

**Radiator cap opening pressure**
**107.9 ~ 137.3 KPa**
**(1.079 ~ 1.373 kg/cm2, 15.35 ~ 19.53 psi)**

- Install the radiator cap tester (1) and adapter (2) onto the radiator cap (3).
- Apply the specified pressure for ten seconds and make sure that there is no drop in pressure.




**Installation**

After installing the cooling system fill the radiator with the proper coolant mixture 50/50 coolant and water.

Loosen the bleed screw on the thermostat housing and allow the air to vent out of the system. The radiator fluid will lower at this time.

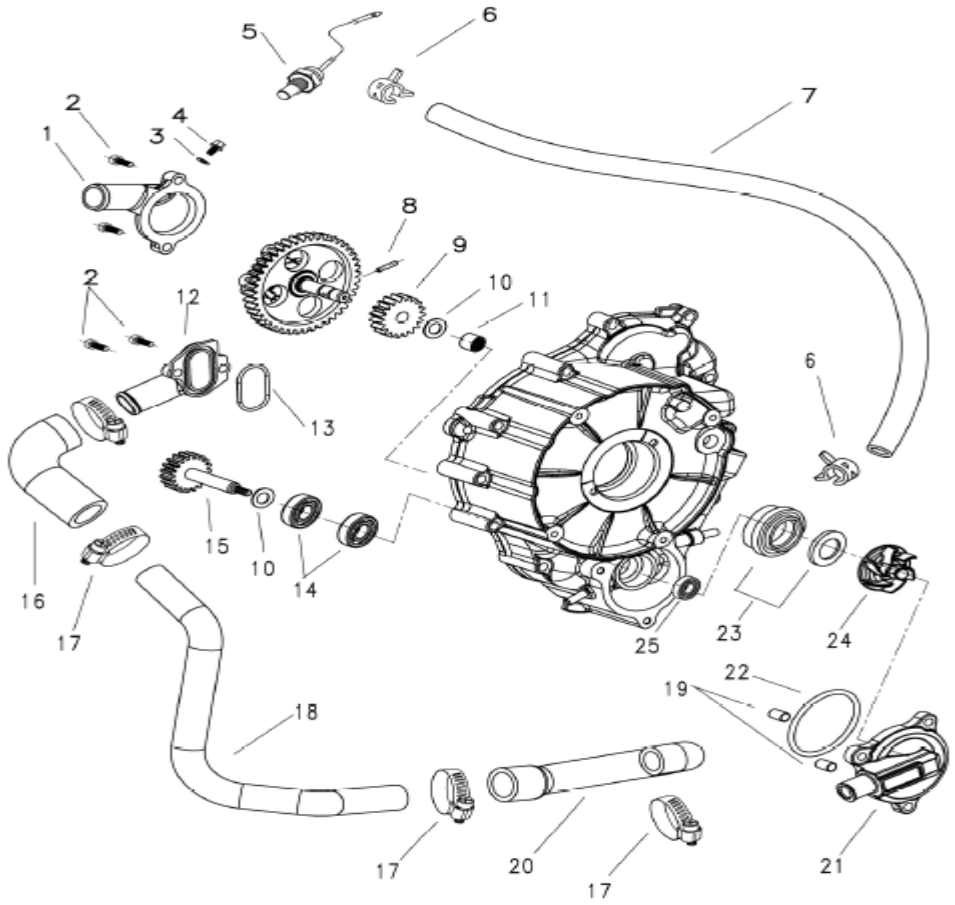
Fill the radiator back up until the level settles and is full. Tighten the bleed screw on the thermostat housing and install the radiator cap.

Fill the coolant reservoir to above the minimum level indicator.

Start the engine and allow it to warm up.

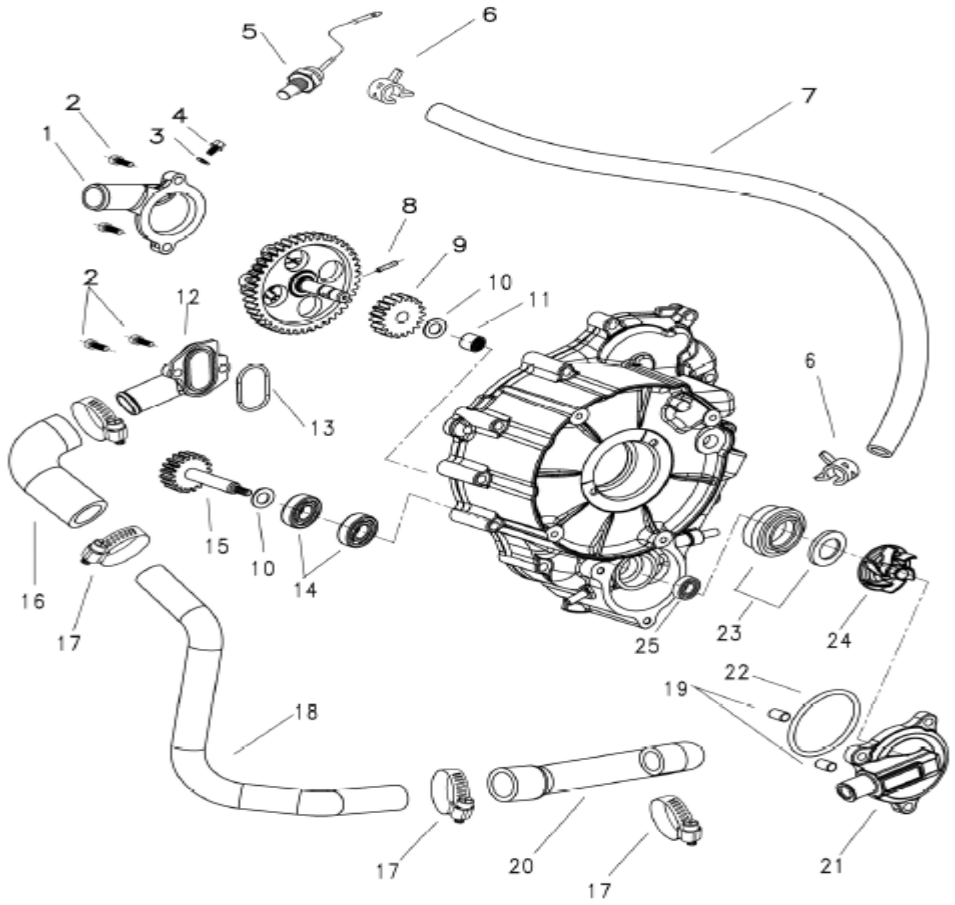
Recheck the coolant level and look for any leaks.

## Water Pump




| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| | **Removing the water pump** | | |
| 1 | Thermostat cover | 1 | |
| 2 | hex flange bolt M6×20 | 2 | |
| 3 | washer 6×13×1.5 | 1 | |
| 4 | hex flange bolt M6×14 | 1 | |
| 5 | water temperature sensor | 1 | |
| 6 | clip II | 2 | |
| 7 | water pipe I | 1 | |
| 8 | Pin | 1 | |
| 9 | Gear, Water pump | 1 | |
| 10 | washer 10×1 | 2 | |
| 11 | bearing 1010 | 1 | |
| 12 | cylinder inlet water joint | 1 | |

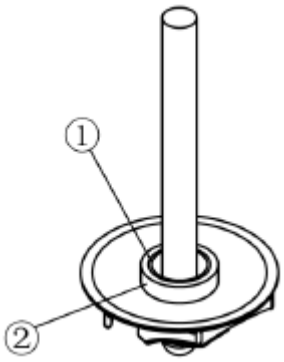
## Water Pump




| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| 13 | O-ring 33.4×2.4 | 1 | |
| 14 | bearing 6000 | 2 | |
| 15 | Gear, Water pump | 1 | |
| 16 | water pipe-400UTV-1 | 1 | |
| 17 | water pipe clip | 4 | |
| 18 | water pipe-400UTV-3 | 1 | |
| 19 | Pin Φ8×11.8 | 2 | |
| 20 | water pipe-400UTV-2 | 1 | |
| 21 | Cover, Water Pump | 1 | |
| 22 | O-ring 50×2.5 | 1 | |
| 23 | Water Seal | 1 | |
| 24 | Vane Wheel | 1 | |
| 25 | Oil Seal 10×20×5 | 1 | |

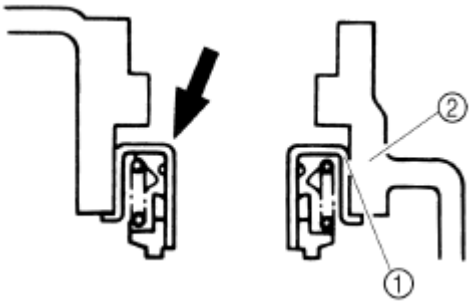
**Disassembly of the Water Pump**

Remove the rubber damper holder (1) and Rubber damper (2).

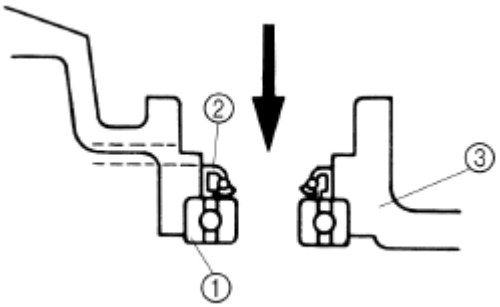



Remove the water pump seal (1) from the water pump housing (2).

***Note:***
**Tap out the water pump seal from the inside of the water pump housing.**



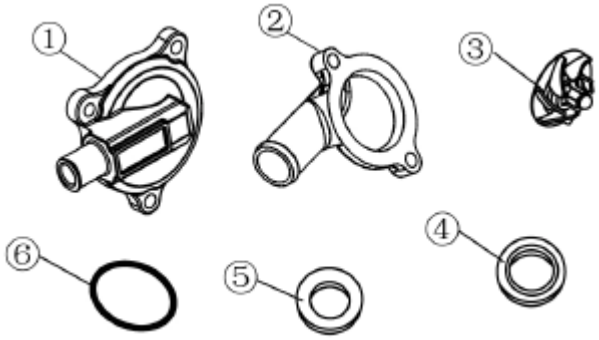

Remove the bearing (1) and oil seal (2) from the water pump housing (3).



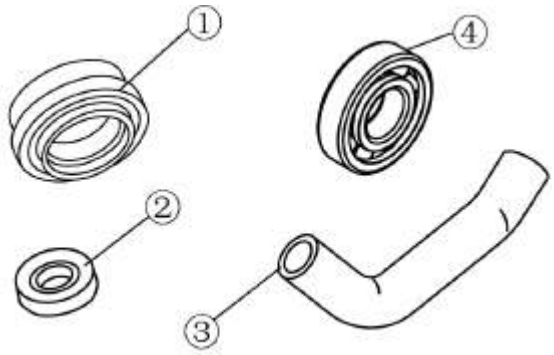

***Note:***
***Tap out the bearing and oil seal from the outside of the water pump housing. Before installation apply lithium based grease to the oil seal and engine oil to the bearing.***

Inspect the water pump housing cover (1), Water pump housing (2), impeller (3), rubber damper (4), rubber damper holder (5) and O-ring (6) for cracks, damage or wear.

When installing use a new o-ring and lubricate it with lithium soap based grease.




Inspect the water pump seal (1), oil seal (2) and water pipe (3) for cracks, damage or wear.



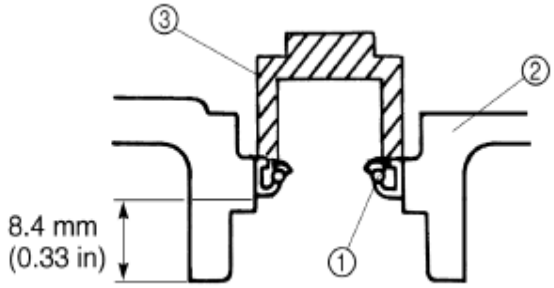

Inspect the bearing (4) for smooth movement.

Measure the impeller shaft tilt.

**Max. impeller shaft tilt**
**0.15 mm (0.006 in)**

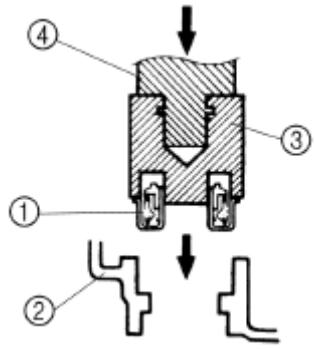
**Assembling the water pump**

Install the oil seal (1) into the water pump housing (2) using a socket (3) that matches the seals outside diameter. Use coolant or tap water as a lubricant for the seals outer surface to aid in installation.



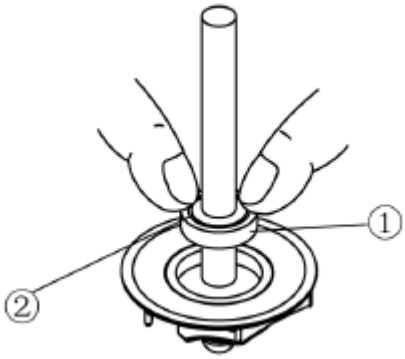

Install the water pump seal (1) into the water pump housing (2) using a mechanical seal installer (3) and water pump seal installer (4).

***Note:***
**Never lubricate the water pump seal surface with oil or grease. Install the water pump seal with the special tools.**

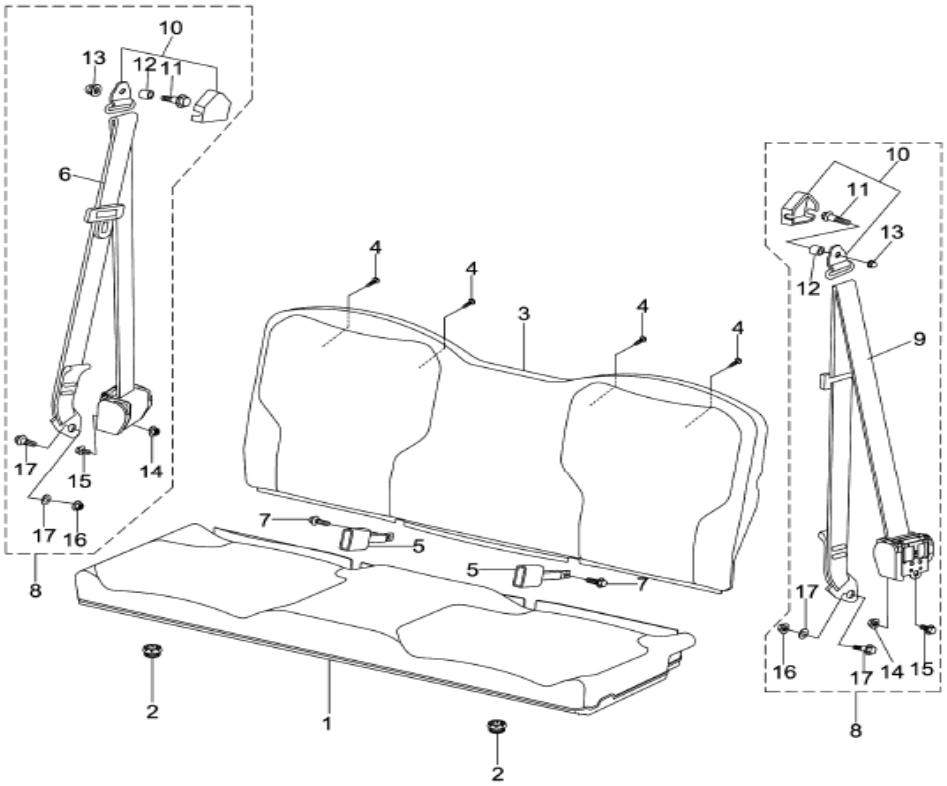



Install the rubber damper (1) and rubber damper holder (2).

***Note:***
**Before installing the rubber damper, apply tap water or coolant onto its outer surface. Make sure that the rubber damper and rubber damper holder are flush with the impeller.**



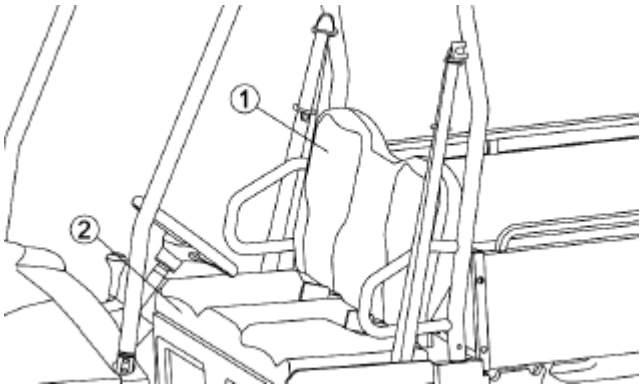
## Seat




| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| | **Removing the seat** | | |
| 1 | Seat Cushion | 1 | |
| 2 | fixing rubber sleeve, seat | 2 | |
| 3 | Back Rest | 1 | |
| 4 | Bolt M6×16 | 8 | |
| 5 | Safety belt buckle | 2 | |
| 6 | Right Safety Belt Assembly (Tri-Point Fixing | 1 | |
| 7 | Style) | 2 | |
| 8 | Hex Flange Bolt M10×1.25×20 | 2 | |
| 9 | Safety Belt Component | 1 | |
| 10 | Left Safety Belt Assembly (Tri-Point Fixing Style) | 2 | |
| 11 | Safety Belt Buckle Cover | 2 | |
| 12 | Six-Angle Flange Bolt M10×1.25×25-Φ14×5 | 2 | |
| 13 | Safety Belt Bushing | 2 | |
| 14 | Nut M10×1.25 | 2 | |
| 15 | Hex Flange Self-locked Nut M10×1.25 | 2 | |
| 16 | Hex Flange Bolt M10×1.25×22 | 2 | |
| 17 | Hex Flange Self-locked Nut M10×1.25 | 2 | |
| 18 | Hex Flange Bolt M10×1.25×25-Φ14×5 | 2 | |
| | Limitation piece, Safety Belt | | |

**Removing the seat**

To remove the seat grab the front of the seat bottom and lift it out of the grommets. Pull it forward and remove the seat bottom.

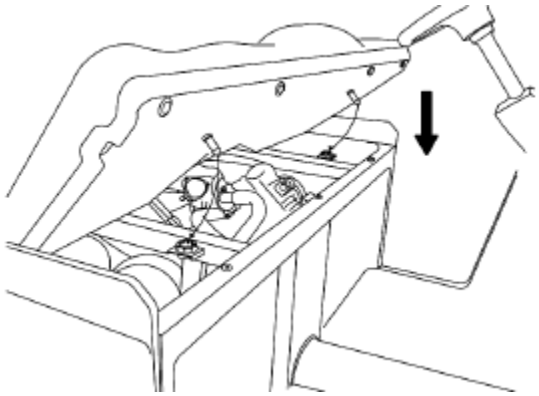



To remove the back rest, remove the fasteners (8) that attach it to the roll-over protection system.

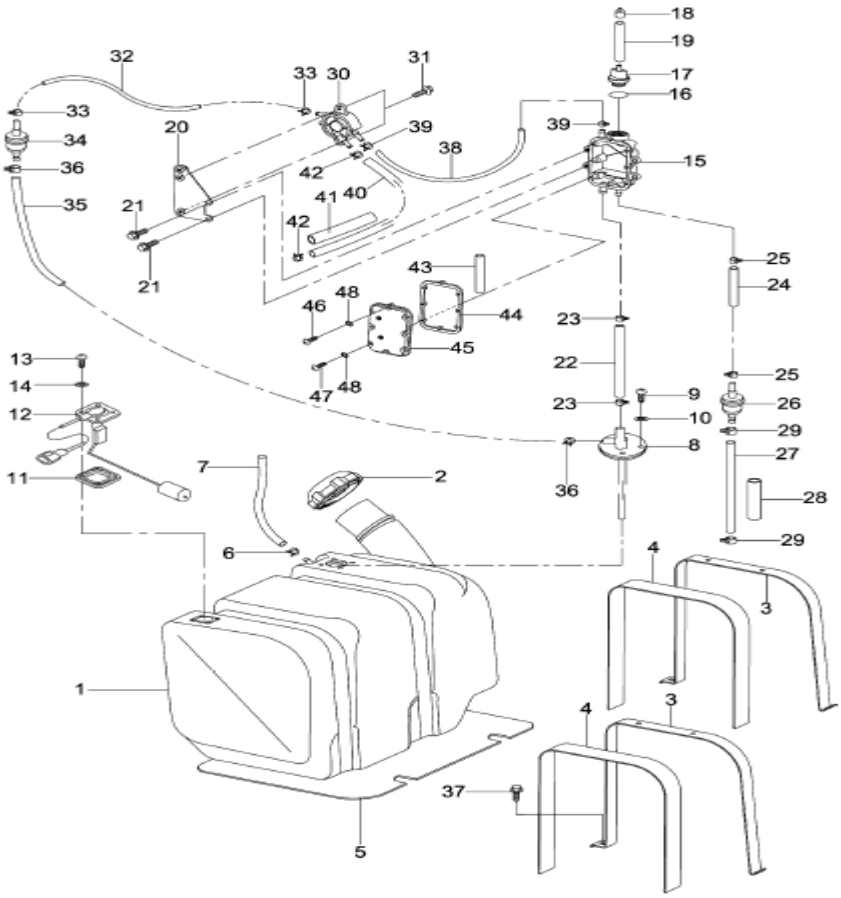
**Installation**

Install the backrest, with 8 fasteners, to the roll-over protection system cross member.

Install the seat bottom by sliding the projections on the back of the seat pan under the seat holders and pushing down on the seat to push the seat pins into the grommets.

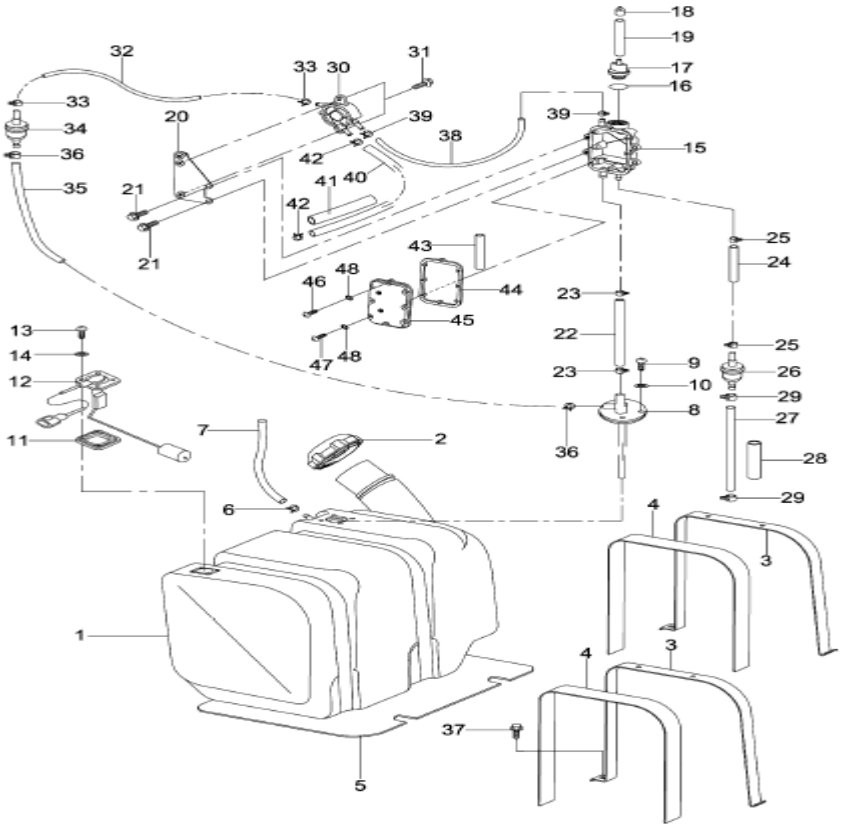


## Fuel Tank



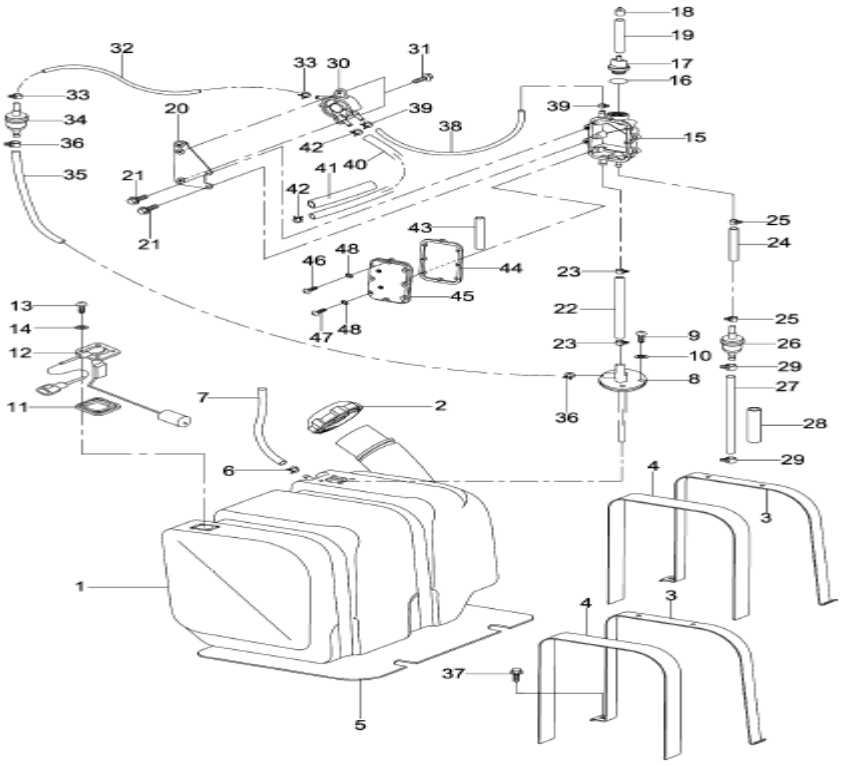

| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| | **Removing the fuel tank** | | |
| 1 | Fuel tank | 1 | |
| 2 | Fuel tank lid | 1 | |
| 3 | Hold-down plate | 2 | |
| 4 | Foam strip | 2 | |
| 5 | Fuel tank rubber cushion | 1 | |
| 6 | Clip Φ10 | 1 | |
| 7 | Fuel Tank Ventilation Pipe Φ7×Φ11×480 | 1 | |
| 8 | Outlet vent pipe holder | 1 | |
| 9 | Screw M5×10 | 4 | |
| 10 | Washer Φ5 | 4 | |
| 11 | Cushion | 1 | |
| 12 | Fuel sensor | 1 | |
| 13 | Screw M5×12 | 4 | |
| 14 | Washer Φ5 | 4 | |
| 15 | Small fuel tank 1 | 1 | |
| 16 | O- seal ring, small fuel tank | 1 | |

## Fuel Tank




| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| 17 | Cap, small fuel tank | 1 | |
| 18 | One Way Valve | 1 | |
| 19 | Ventilate tube, Small fuel tank Φ4.5×Φ8×380 | 1 | |
| 20 | Pump holder | 1 | |
| 21 | Hex Flange Bolt M6×8 | 1 | |
| 22 | Fuel Return Pipe, small oiler | 1 | |
| 23 | Clip Φ9 | 2 | |
| 24 | Outlet Fuel Pipe, Small Oiler | 1 | |
| 25 | Clip Φ9 | 2 | |
| 26 | Oil filter assembly | 1 | |
| 27 | Vacuum tube, Vacuum pump | 1 | |
| 28 | Long foam cover | 1 | |
| 29 | Clip Φ10 | 2 | |
| 30 | Fuel pump | 1 | |
| 31 | Hex Flange Bolt M6×16 | 2 | |
| 32 | Inlet Fuel Pipe, Vacuum pump | 1 | |
| 33 | Clip Φ9 | 1 | |

## Fuel Tank

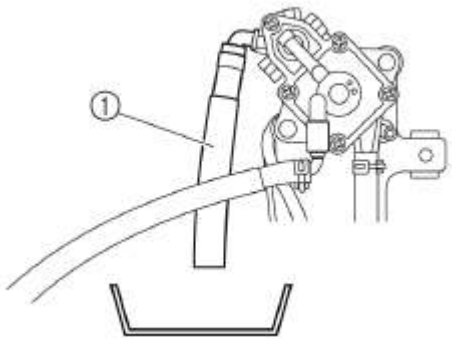



| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| 34 | Oil filter assembly | 1 | |
| 35 | Fuel Outlet Pipe, Fuel Tank | 1 | |
| 36 | Clip Φ9 | 1 | |
| 37 | Hex Flange Bolt M8×25 | 2 | |
| 38 | Fuel Outlet Pipe, Vacuum pump | 1 | |
| 39 | Clip Φ9 | 1 | |
| 40 | Vacuum tube, Vacuum pump | 1 | |
| 41 | Long foam cover | 1 | |
| 42 | Clip Φ10 | 2 | |
| 43 | Reflux pipe | 1 | |
| 44 | Seal ring, reserve oil tank | 1 | |
| 45 | Small fuel tank 2 | 1 | |
| 46 | Screw M4×12 | 1 | |
| 47 | Screw M4×16 | 7 | |
| 48 | Circlip Φ4 | 8 | |

**Checking the operation of the fuel pump**

Remove the seat bottom and right protector.

Place a fuel can under the end of Hose (1).




Attach a mighty-vac to the end ov the vacuum hose. Pump the mighty-vac and fuel should flow out hose (1).

Reattach hoses and install right protector and seat bottom.

**Oil cooling system**

**Disassembly**

Remove the oil cooler.

Remove the connecting oil lines.

Disassemble the rubber hoses.

**Inspection**

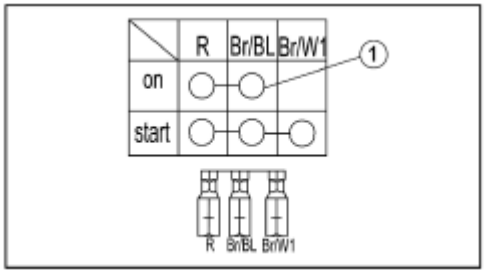
Look at the oil lines for distortion. Look for leaks.

Inspect the rubber hoses for cracks or damage. Look for signs of aging or bulging.

Drain out the oil and perform a pressure test of the oil cooling system. The pressure should be 0.3 MPA.

Use compressed air through the oil cooler, oil line and rubber hoses at 0.03 MPA for 3 minutes. The system should not leak.

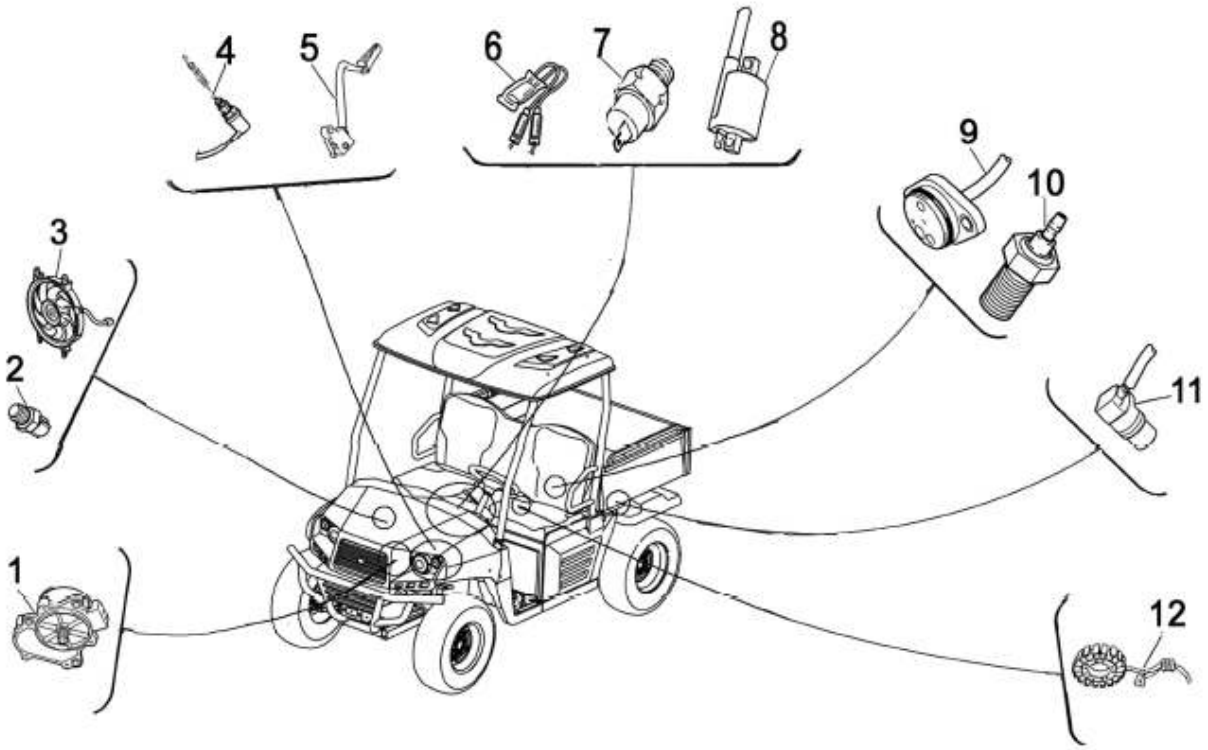
Reassemble the system and pour a liter of engine oil into the oil cooler, start the engine and check for leaks.





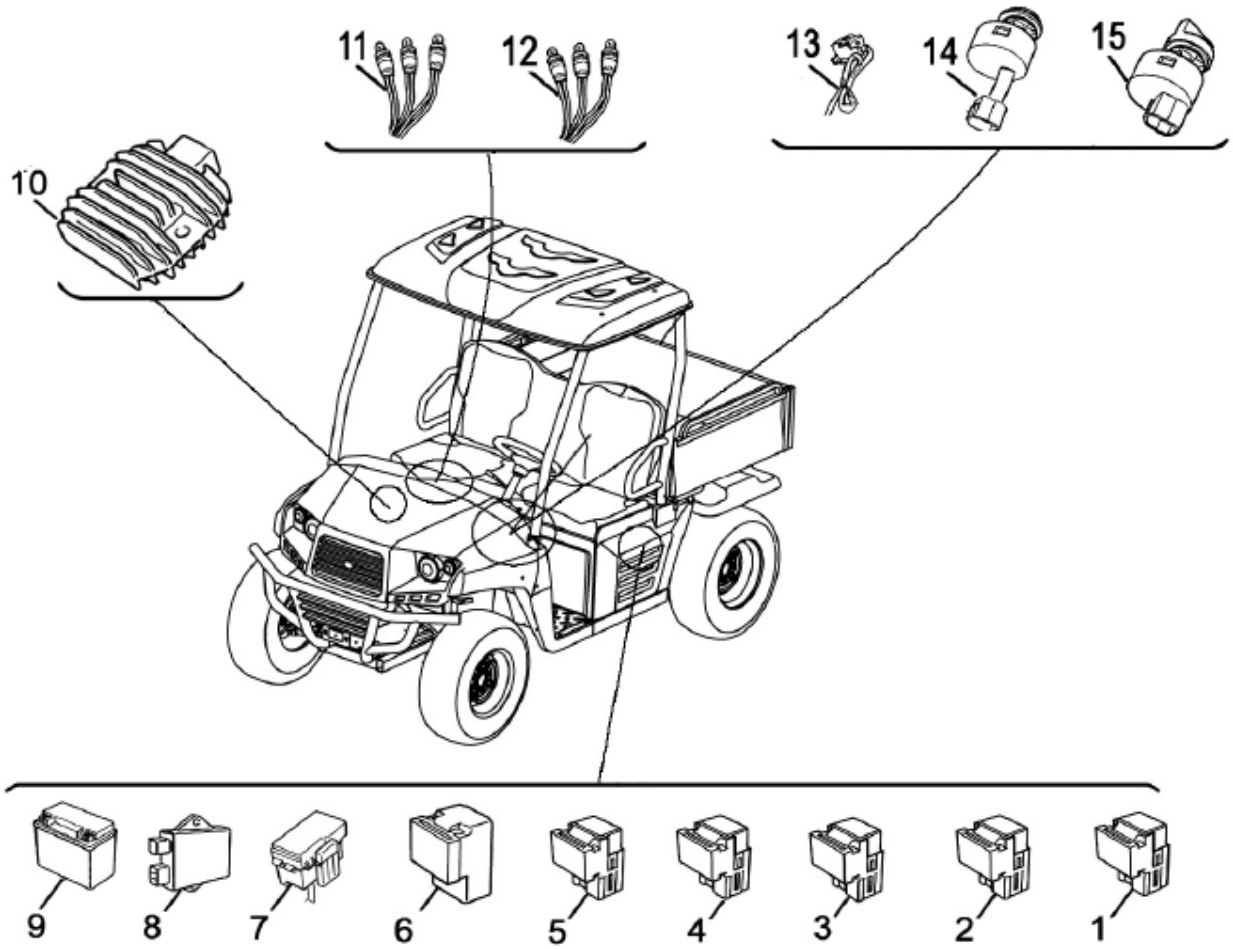
| | | | |
|---|---|---|---|
| **Electrical Components** | **6-3** | **Charging System Circuit Diagram, troubleshoot** | **6-21** |
| **Battery Basics** | **6-5** | | |
| **Charging a Lead Acid Battery** | **6-6** | **Lighting System Circuit Diagram, troubleshoot** | **6-23** |
| **Charging a Maintenance Free Battery** | **6-8** | **Signal System Circuit Diagram, troubleshoot** | **6-27** |
| **Testing a Switch** | **6-9** | **Cooling System Circuit Diagram, troubleshoot** | **6-34** |
| **Switch Continuity** | **6-10** | | |
| **Bulbs and Bulb Sockets** | **6-11** | **2WD/4WD Selecting System Circuit Diagram, troubleshoot** | **6-37** |
| **Ignition System Circuit Diagram, troubleshoot** | **6-12** | | |
| **Electric Start Circuit Diagram, troubleshoot** | **6-16** | | |

## Electrical Components




1. Gear motor
2. Thermo switch 2
3. Radiator fan
4. Brake light switch
5. Parking brake switch
6. Circuit breaker(radiator fan motor)
7. Thermo switch 1
8. Ignition coil
9. Gear position switch
10. Reverse switch
11. Speed sensor
12. Pickup coil/stator assembly

## Electrical Components




1. Four-wheel drive relay 1
2. Four-wheel drive relay 2
3. Starter relay
4. Four-wheel drive relay 3
5. Differential gear lock indicator light relay
6. Four-wheel drive indicator light relay
7. Fuse box
8. C.D.I. unit
9. Battery
10. Rectifier/regulator
11. Indicator light assembly 1
12. Indicator light assembly 2
13. On-Command four-wheel drive switch and differential gear lock switch
14. Main switch
15. Light switch

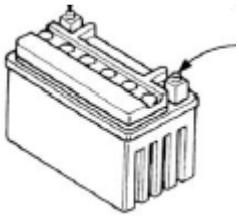
**Whenever performing any type of electrical test it is very important to start off with a known good Battery! Check the charge State of the Battery. It needs to be fully charged.**

There are 2 types of Batteries commonly used on UTV's.

- Lead Acid Battery
- Maintenance Free Battery

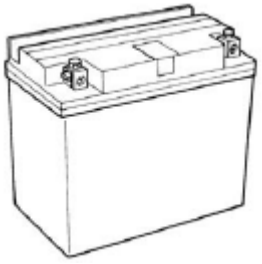
**Lead Acid Battery**

The lead acid battery is the most common in the industry. There are a couple of things that affect the lifespan of the battery. Heat and state of charge are the two biggest factors in how long a battery survives. The typical lifespan of a lead acid battery is 1 to 2 years but if maintained with a battery tender they can survive longer.



**Maintenance Free Battery**

The maintenance free battery is a sealed battery and is usually a Gel type or a Glass Mat battery. The term maintenance free means that nothing should be added to the battery. These Batteries still need to be kept at their fullest state of charge in order to get the most life out of them. The typical Lifespan for a maintenance free battery is 3 to 4 years again depending on if it has been kept at its fullest state of charge.



**Each type of Battery requires its own method of charging.**

***Note: Improper charging will adversely affect the lifespan of the Battery.***

***Warnings:***

***Batteries generate explosive gas and contain electrolyte, which is made of sulfuric acid, a highly poisonous and caustic chemical. Whenever working with batteries always follow these preventative measures:***

- ***Wear eye protection, Eye shield or safety glasses with side shields.***
- ***Charge batteries in a well ventilated area.***
- ***Keep batteries away from sparks or fire, open flames. (welding equipment, grinding equipment, Cigarette smoking etc.)***
- ***Do Not Smoke when charging or handling a battery.***
- ***Keep batteries and electrolyte out of the reach of children.***
- ***Avoid body contact with electrolyte as it can cause severe burns and or permanent eye damage.***

***First Aid in case of Bodily Contact:***

- ***Skin: Wash thoroughly with water***
- ***Eyes: Flush with water for 15 minutes and seek immediate medical attention.***

***Installing a battery into the UTV, always connect the Positive terminal first then the negative terminal. This is to help prevent any type of spark. Reverse this for removal from the UTV.***

**Charging a Lead Acid Battery**

Always use a charger that will charge at a rate 1/10 the amp hour rating of the battery. It is also a good idea to use a charger that will not overcharge, or shuts off when it reaches a full charge.

Higher rates of charge have a chance of warping the plates inside the battery and diminishing its lifespan. In other words a quick charge is not good for the battery.

Always remove the battery From the UTV prior to charging.

***Using a Constant Voltage Charger (Lead Acid Battery)***

Measure the open circuit voltage prior to charging.

Connect the charger and ammeter to the battery and start charging. Make sure the setting is at 1/10 the amp hour rating of the battery. This is typically 2 amp 12 Volts.

Is the amperage higher than the standard charging amperage written on the battery?

Yes

No

Charge the battery until the charging amperage drops all the way down, usually 1 amp.

***Set Charge time to a maximum of 20 hours***

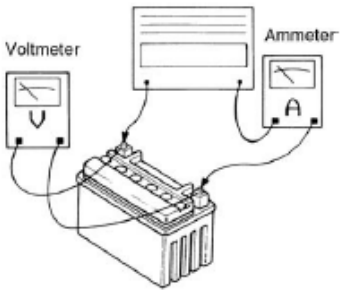
This type of battery charger cannot charge a Maintenance Free Battery. A Variable Rate charger is Needed.

Leave battery for 30 minutes to settle before measuring the open circuit voltage.

12.8 V Fully Charged

12.0-12.7 V Not Fully Charged

Under 12.0 V Replace the Battery



## *Charging a Maintenance Free Battery*

### *Using a Variable Rate Charger (Maintenance Free Batteries)*

Measure the open circuit voltage.

Connect a charger and ammeter to the battery and start charging.

Is the amperage higher than the standard charging amperage written on the battery?

***No***

Adjust the charging voltage to 20-25 V.

Monitor the amperage for 3-5 minutes. Is the standard charging amperage exceeded?

If the amperage does not exceed the standard charging amperage after 5 minutes, replace the battery.

***Yes***

Adjust the voltage to obtain the standard charging amperage.

Set the timer to the charging time determined by the open circuit voltage.

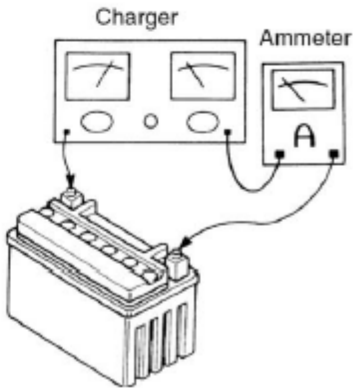
If the required charging time exceeds 5 hours, recheck the charging amperage and adjust the voltage to obtain the standard charging amperage.

Let the battery sit for 30 minutes, then measure the open circuit voltage.

12.8 V or more Charging is complete

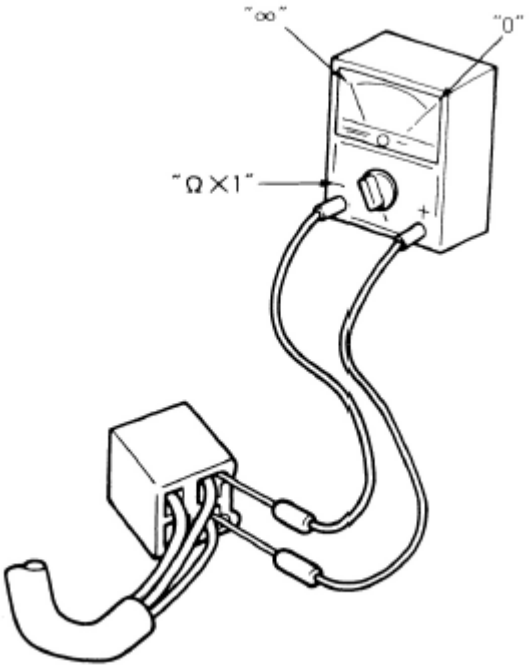
12.0-12.7V Recharging is required.

**Set the charging voltage to 16-17 V.**



**Testing the switch**

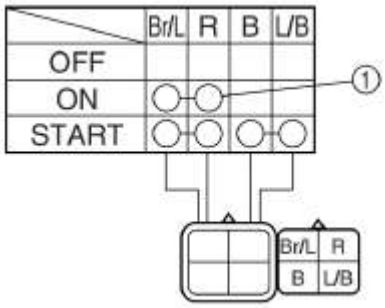
Use a pocket tester to check the terminals for continuity. If the continuity is faulty at any point, replace the switch.




***Note:***

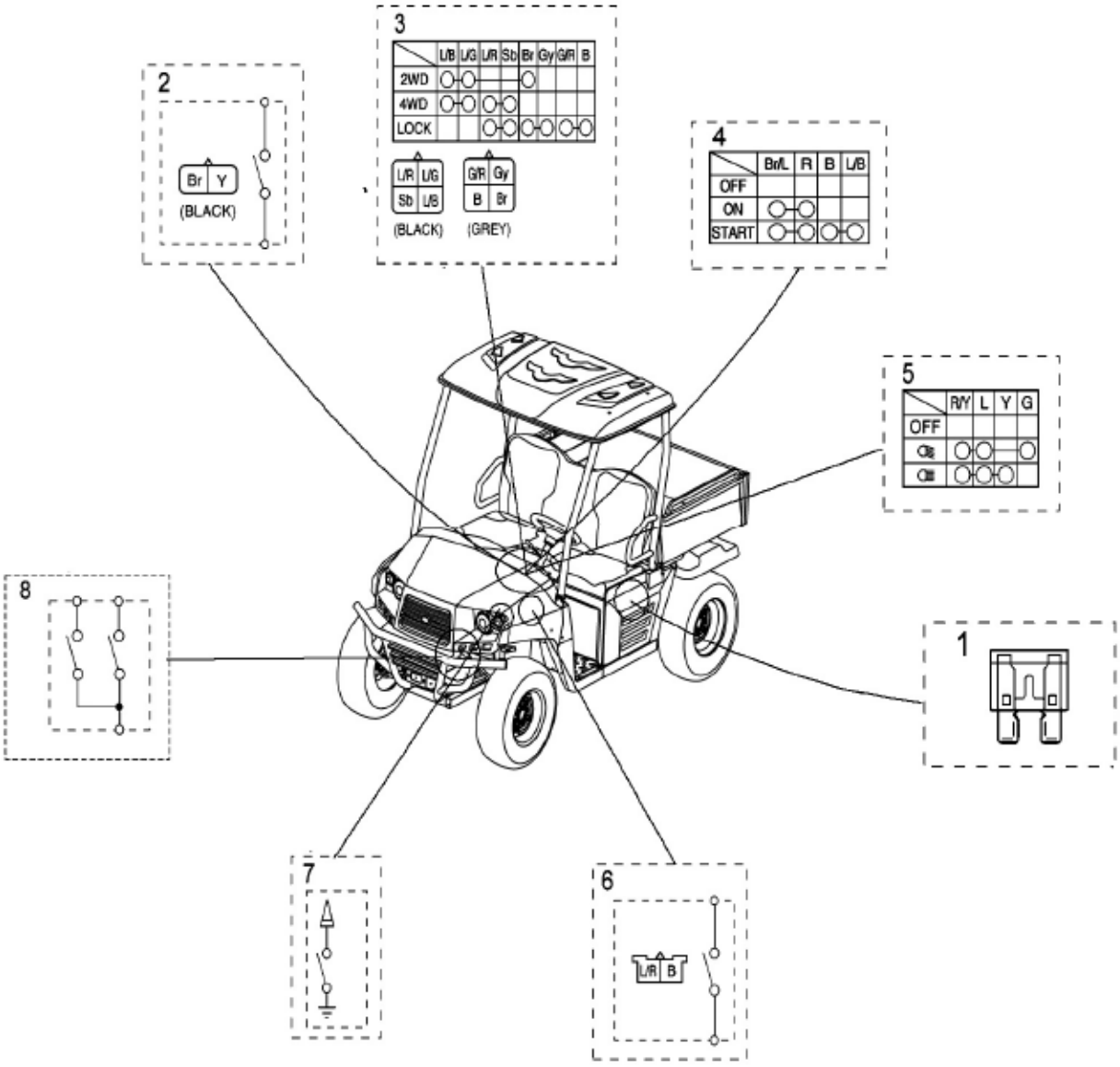
**• Set the pocket tester to "0" before starting the test.**
**• The pocket tester should be set to the "Ω ×1" range when testing the switch for continuity.**
**• Turn the switch on and off a few times when checking it.**

The terminal connections for switches (main switch, light switch, etc.) are shown in a chart similar to the one on the right. This chart shows the switch positions in the column and the switch lead colors in the top row.
For each switch position, "O—O" indicates the terminals with continuity.




**The example chart shows that:**
(1)There is continuity between the "Brown/Blue and Red" leads when the switch is set to "ON".

## Checking the switch continuity




1. Fuse
2. Brake light switch
3. Main switch
4. On-Command four-wheel drive switch and differential gear lock switch
5. Light switch
6. Parking brake switch
7. Reverse switch
8. Four-wheel drive switch

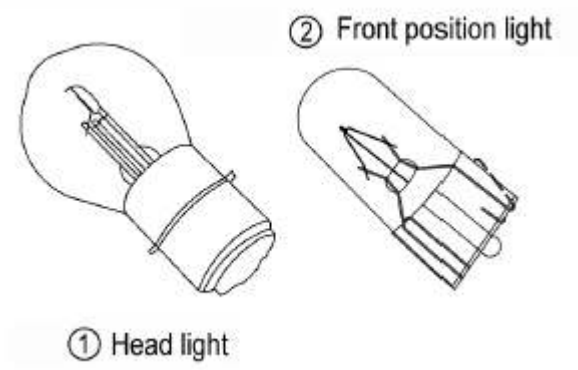
**Checking the Bulbs and Bulb Sockets**

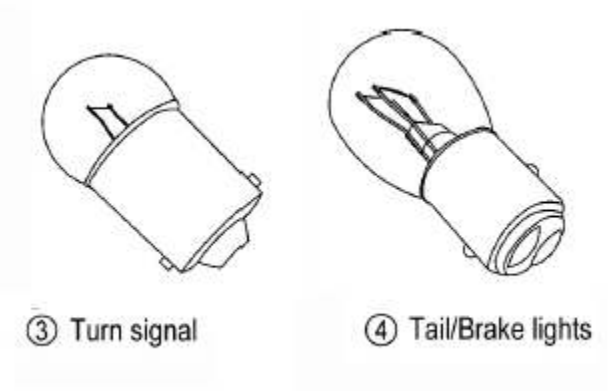
Check each bulb and bulb socket for damage or wear, proper connections, and also for continuity between the terminals. If damage wear or corrosion is found replace the bulb, bulb socket or both. Check the continuity of the socket and the bulb.

***Warning:***
***Since the bulb gets extremely hot, keep flammable products and your hands away from the bulb until it has cooled down.***

***Caution:***

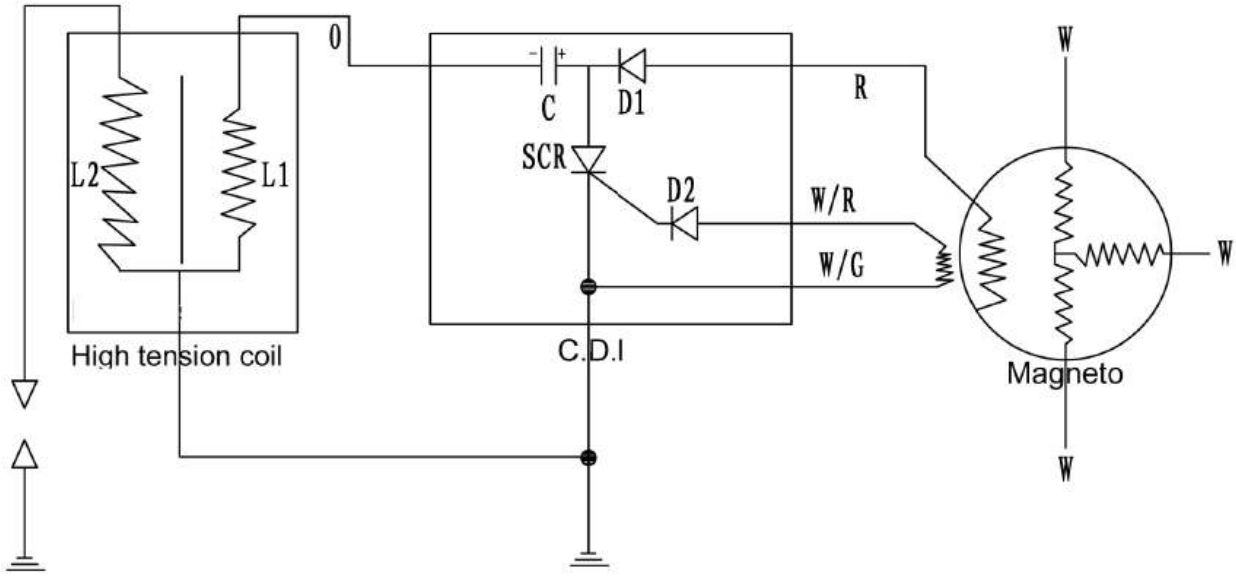
- ***Be sure to hold the socket firmly when removing the bulb. Never pull the lead, otherwise it may be pulled out of the terminal in the coupler.***
- ***Avoid touching the glass part of the bulb to keep it free from oil, otherwise the transparency of the glass, the life of the bulb and the luminous flux will be adversely affected. If the bulb gets soiled, thoroughly clean it with a cloth moistened with alcohol or lacquer thinner.***



# IGNITION SYSTEM

## CIRCUIT DIAGRAM




### Troubleshooting

### IF THE IGNITION SYSTEM FAILS TO OPERATE (NO SPARK OR INTERMITTENT SPARK):

Check the following:

1. Fuses (main, ignition)
2. Battery
3. Spark plug
4. Ignition spark gap
5. Spark plug cap resistance
6. Ignition coil resistance
7. Main switch
8. Pickup coil resistance
9. Rotor rotation direction detection coil resistance
10. Wiring connections (the entire ignition system)

1.Fuses (main, ignition)

Refer to "CHECKING THE SWITCH".

NO CONTINUITY → Replace the fuse(s).

CONTINUITY ↓

2. Battery

- Check the battery condition. Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.

**Open-circuit voltage**
**12.8 V or more at 20 °C (68 °F)**

INCORRECT →
- Clean the battery terminals.
- Recharge or replace the battery.

CORRECT ↓

3. Spark plug

- Check the spark plug condition.
- Check the spark plug type.
- Check the spark plug gap.

Refer to "CHECKING THE SPARK PLUG" in chapter 3.

4. Ignition spark gap

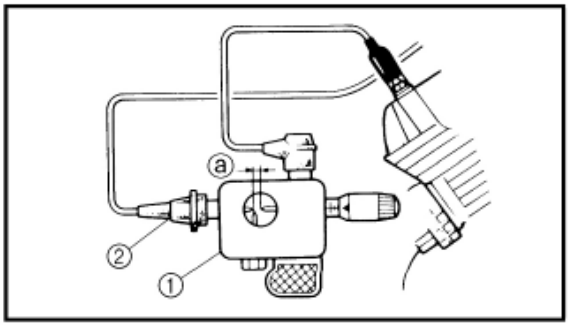
- Disconnect the spark plug cap from the spark plug.
- Connect the pulse ignition spark checker or ignition checker ① as shown.

② Spark plug cap

- Turn the main switch to "ON".
- Check the ignition spark gap ⓐ.
- Crank the engine by pushing the starter switch, and increase the spark gap until a misfiring occurs.

**Minimum spark gap**
**6.0 mm (0.24 in)**

INCORRECT → Repair or replace the spark plug.




MEETS SPECIFICATION → The ignition system is not faulty.

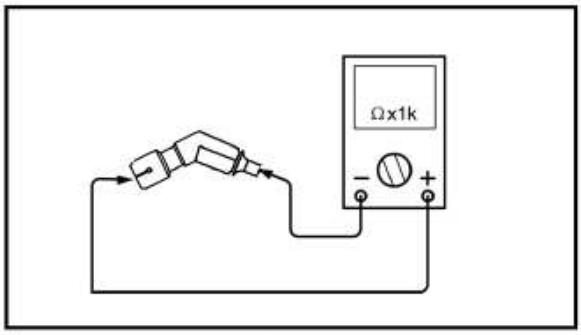
OUT OF SPECIFICATION OR NO SPARK ↓

5. Spark plug cap resistance

- Remove the spark plug cap.
- Connect the pocket tester (Ω × 1k) to the spark plug cap.
- Check that the spark plug cap has the specified resistance.

**Spark plug cap resistance**

**10 kΩ at 20 °C (68 °F)**




OUT OF SPECIFICATION

Replace the spark plug cap.

MEETS SPECIFICATION

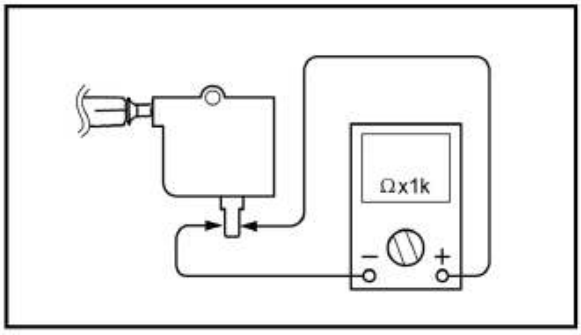
6. Ignition coil resistance

- Disconnect the ignition coil connector from the wire harness
- Connect the pocket tester (Ω × 1) to the ignition coil.

**Tester (+) lead → Orange lead terminal**

**Tester (–) lead → Ignition coil base**

- Check that the primary coil has the specified




. resistance

**Primary coil resistance**

**0.18 ~ 0.28 Ω at 20 °C (68 °F)**

- Connect the pocket tester (Ω × 1k) to the ignition coil.

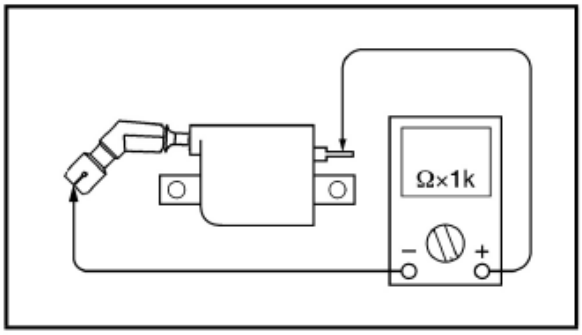
**Tester (+) lead → Orange lead terminal**

**Tester (–) lead → Spark plug lead**

- Check that the secondary coil has the specified resistance.

**Secondary coil resistance**

**6.32 ~ 9.48 kΩ at 20 °C (68 °F)**




OUT OF SPECIFICATION

Replace the ignition coil.

BOTH MEET SPECIFICATION

7. Main switch

Refer to "CHECKING THE SWITCH"

INCORRECT → Replace the main switch.

CORRECT

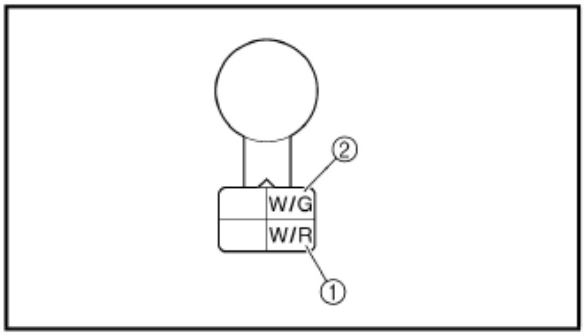
8. Pickup coil resistance

- Disconnect the A.C. magneto coupler from the wire harness.
- Connect the pocket tester (Ω × 100) to the pickup coil terminal.

**Tester (+) lead → White/Red terminal ①**
**Tester (–) lead → White/Green terminal ②**

- Check the pickup coil for the specified resistance.

**Pickup coil resistance**
**459 ~ 561 Ω at 20 °C (68 °F)**
**(White/Red – White/Green)**




OUT OF SPECIFICATION → Replace the pickup coil/stator assembly.

MEETS SPECIFICATION

9.Wiring connection

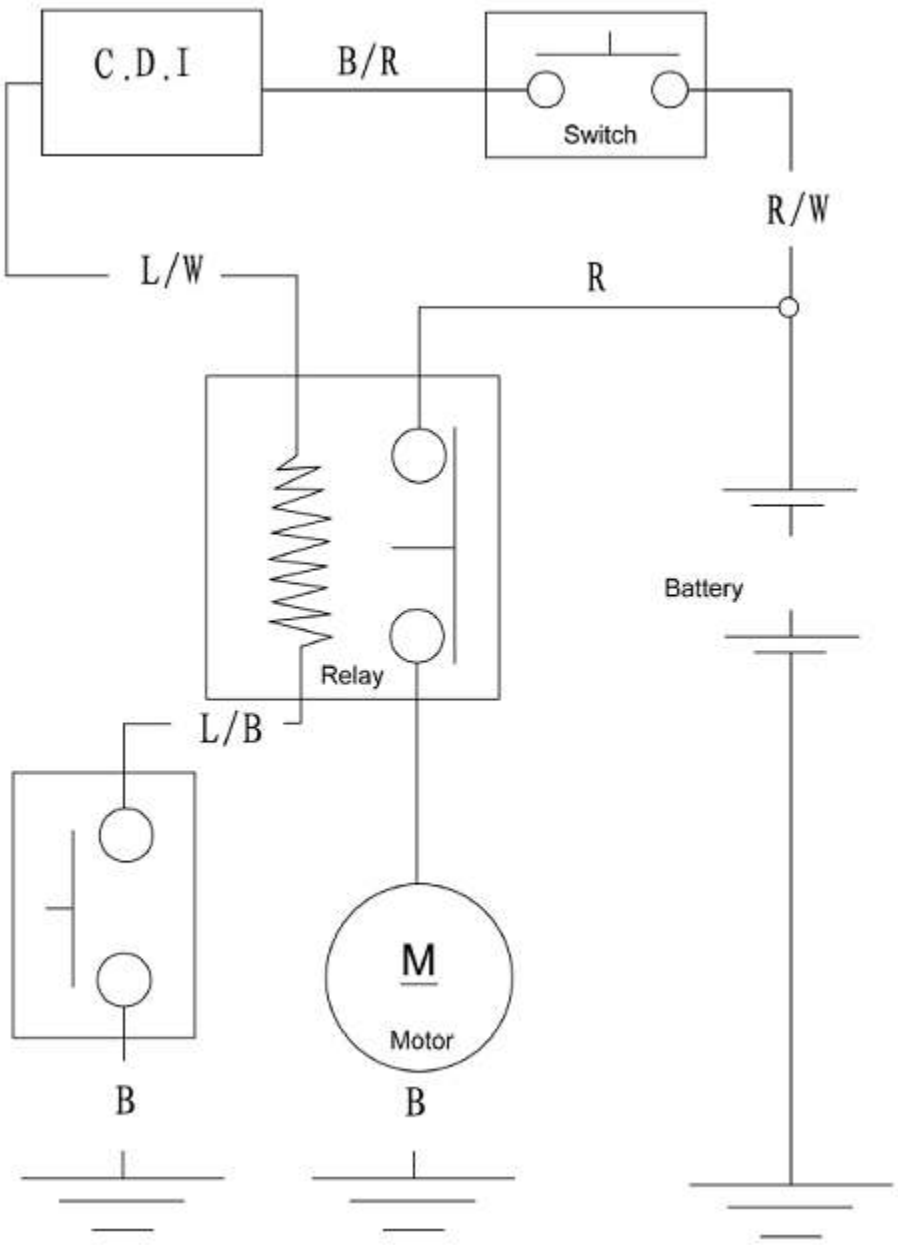
- Check the connections of the entire ignition system. Refer to "CIRCUIT DIAGRAM".

POOR CONNECTION → Properly connect the ignition system.

CORRECT

Replace the C.D.I. unit

**ELECTRIC STARTING SYSTEM**
**CIRCUIT DIAGRAM**

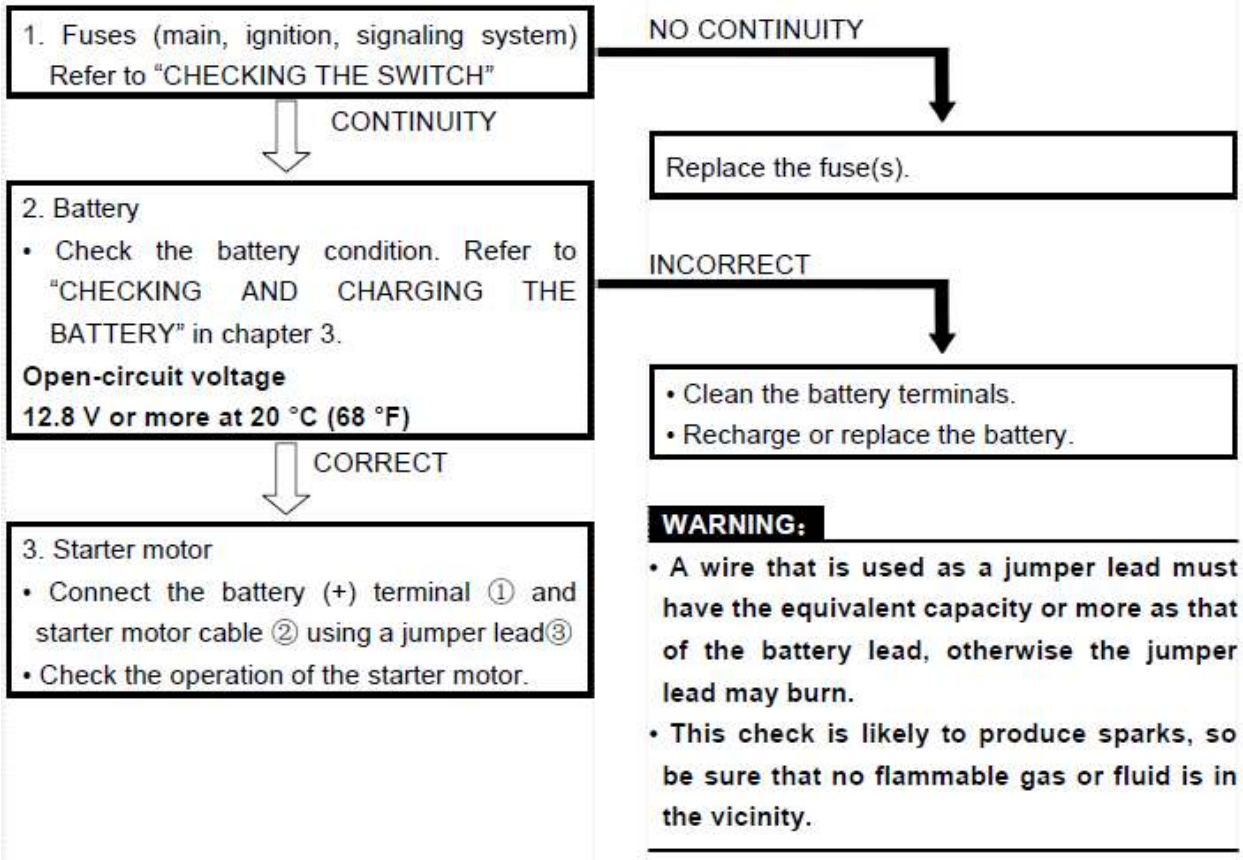


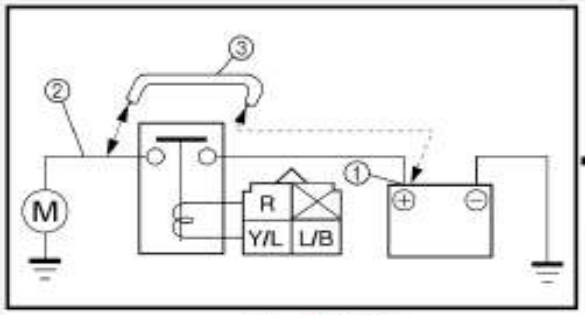
**Troubleshooting**

**IF THE STARTER MOTOR FAILS TO OPERATE:**

Check the following:

1. Fuses (main, ignition, signaling system)
2. Battery
3. Starter motor
4. Starter relay
5. Main switch
6. Gear position switch
7. Brake light switch
8. Diode 1
9. Wiring connections (the entire starting system)


1. Fuses (main, ignition, signaling system)
Refer to "CHECKING THE SWITCH"
NO CONTINUITY
Replace the fuse(s).
CONTINUITY
2. Battery
• Check the battery condition. Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.
Open-circuit voltage
12.8 V or more at 20 °C (68 °F)
INCORRECT
• Clean the battery terminals.
• Recharge or replace the battery.
CORRECT
3. Starter motor
• Connect the battery (+) terminal ① and starter motor cable ② using a jumper lead③
• Check the operation of the starter motor.
WARNING:
• A wire that is used as a jumper lead must have the equivalent capacity or more as that of the battery lead, otherwise the jumper lead may burn.
• This check is likely to produce sparks, so be sure that no flammable gas or fluid is in the vicinity.

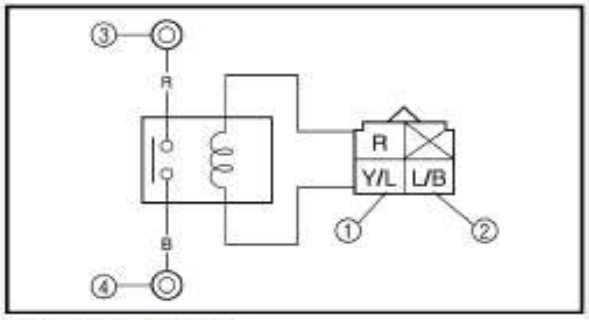



DOSE NOT TURN

Repair or replace the starter motor.

TURNS

4. Starter relay
• Remove the starter relay from the wire harness.
• Connect the pocket tester (Ω × 1) and the battery (12 V) to the starter relay terminals.
**Battery (+) terminal → Yellow/Blue terminal ①**
**Battery (–) terminal → Blue/Black terminal ②**
**Tester (+) lead → Red terminal ③**
**Tester (–) lead → Black terminal ④**
• Check the starter relay for continuity.




NO CONTINUITY

Replace the starter relay.

CONTINUITY

5. Main switch Refer to "CHECKING THE SWITCH".

INCORRECT

Replace the main switch.

CORRECT

6. Gear position switch Refer to "CHECKING THE SWITCH".

INCORRECT

Replace the gear position switch.

CORRECT

7. Brake light switch Refer to "CHECKING THE SWITCH".

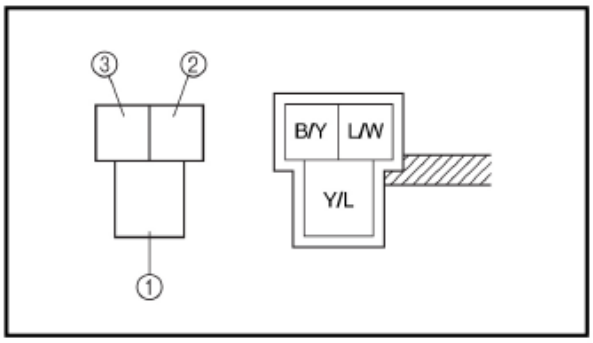
INCORRECT

Replace the brake light switch.

CORRECT

8. Diode 1
• Remove the diode from the coupler
• Connect the pocket tester (Ω × 1) to the diode terminals as shown.
• Check the diode for continuity as follows

| | |
|---|---|
| Tester (+) lead<br>→ Yellow/Blue terminal ①<br>Tester(–)lead<br>→ Black/Yellow terminal ② | Continuity |
| Tester(+) lead<br>→ Yellow/Blue terminal ①<br>Tester (–) lead<br>→ Blue/White terminal ③ | |
| Tester (+)lead<br>→ B lack/Yellow terminal ②<br>Tester (–) lead<br>→ Yellow/Blue terminal ① | NO Continuity |
| Tester(+) lead<br>→ Blue/White terminal ③<br>Tester(–)lead<br>→ Yellow/Blue terminal ① | |




**NOTE:**

**When you switch the tester's positive and negative probes, the readings in the left chart will be reversed.**

INCORRECT

Replace the diode 1.

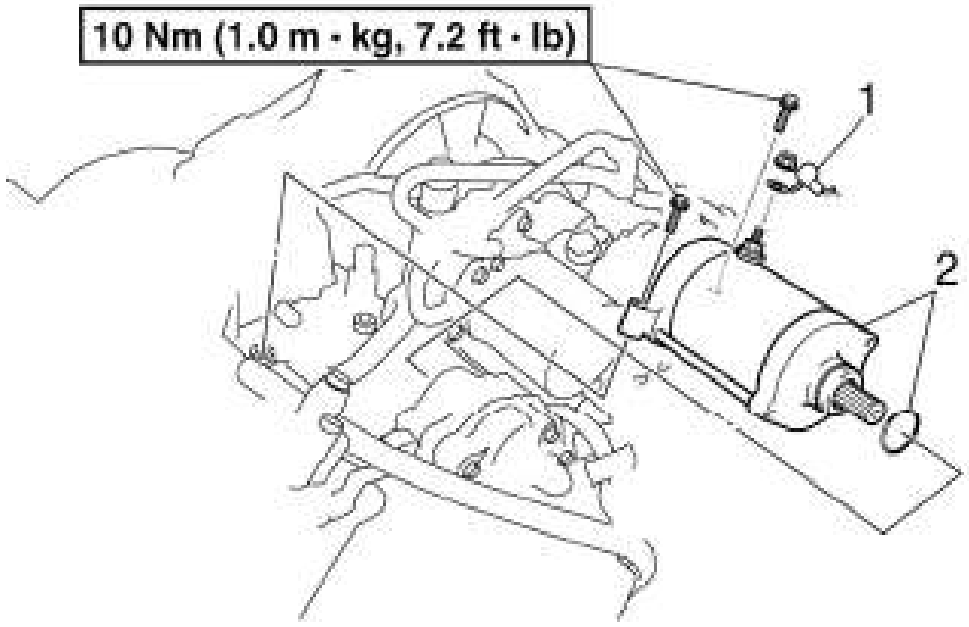
CORRECT

9. Wiring connection
• Check the connections of the entire starting system. Refer to "CIRCUIT DIAGRAM".

POOR CONNECTION

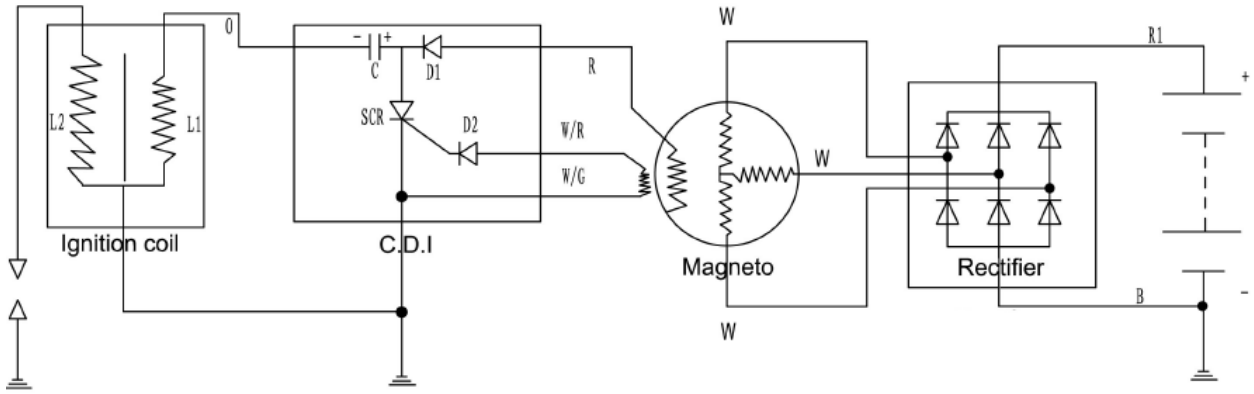
Properly connect the starting system.

## Starter Motor




| No. | Part Name | Qty | Remarks |
|---|---|---|---|
| | **Removing the starter motor** | | |
| 1 | Starter motor lead | 1 | |
| 2 | Starter motor/O-ring | 1/1 | |

## CHARGING SYSTEM CIRCUIT DIAGRAM




### Troubleshooting

### If the Battery is not Charging:

Check the following:

1. Fuse (main)
2. Battery
3. Charging voltage
4. Charging coil resistance
5. Wiring connections (the entire charging system)

1. Fuse (main)

Refer to "CHECKING THE SWITCH".

NO CONTINUITY → Replace the fuse.

CONTINUITY ↓

2.Battery

- Check the battery condition. Refer to "CHECKING AND CHARGING THE BATTERY in chapter 3.

**Open-circuit voltage**

**12.8 V or more at 20 °C (68 °F)**

INCORRECT → • Clean the battery terminals. • Recharge or replace the battery.

CORRECT ↓

3. Charging voltage

- Connect the engine tachometer to the spark plug lead.
- Connect the pocket tester (DC 20 V) to the battery.

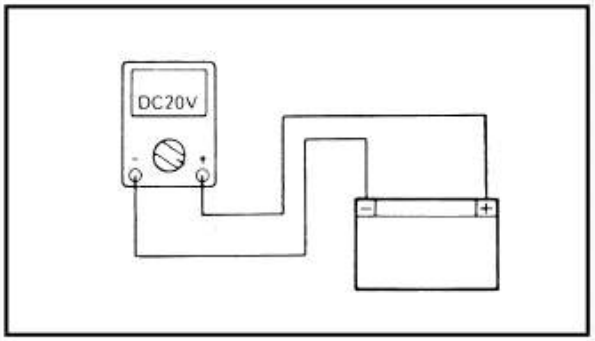
**Tester (+) lead → Battery (+) terminal**
**Tester (–) lead → Battery (–) terminal**

- Start the engine and accelerate to about 1,000 r/min.

**Charging voltage 14 V at 1,000 r/min**

**NOTE:**

**Use a fully charged battery.**




MEETS SPECIFICATION

OUT OF SPECIFICATION

The charging circuit is not faulty.

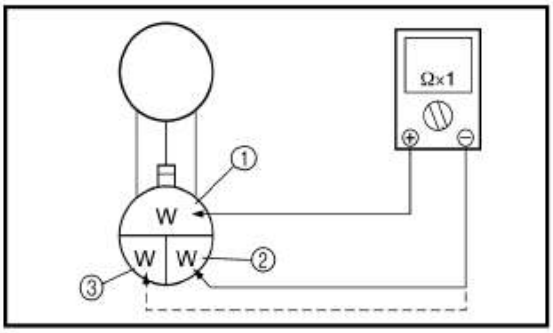
4. Charging coil resistance

- Disconnect the A.C. magneto coupler from the wire harness.
- Connect the pocket tester (Ω × 1) to the charging coils.

**Tester (+) lead → White terminal ①**
**Tester (–) lead → White terminal ②**
**Tester (+) lead → White terminal ①**
**Tester (–) lead → White terminal ③**

- Measure the charging coil resistance.

**Charging coil resistance**
**0.32 ~ 0.43 Ω at 20 °C (68 °F)**




OUT OF SPECIFICATION

Replace the pickup coil/stator assembly.

MEETS SPECIFICATION

5. Wiring connections

- Check the connections of the entire charging system. Refer to "CIRCUIT DIAGRAM".

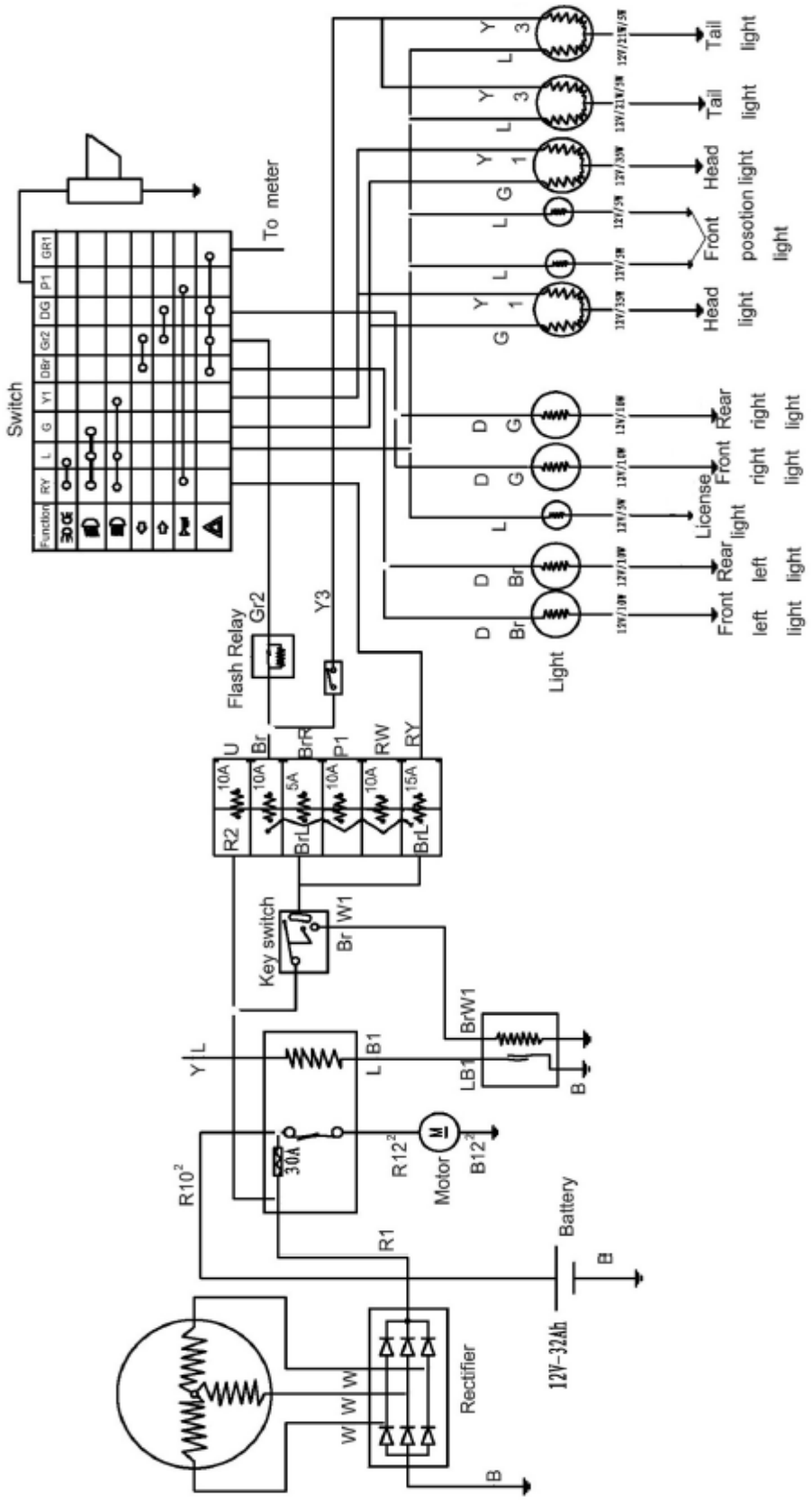
POOR CONNECTION

Properly connect the charging system.

CORRECT

Replace the rectifier/regulator.

## Lighting System Circuit Diagram



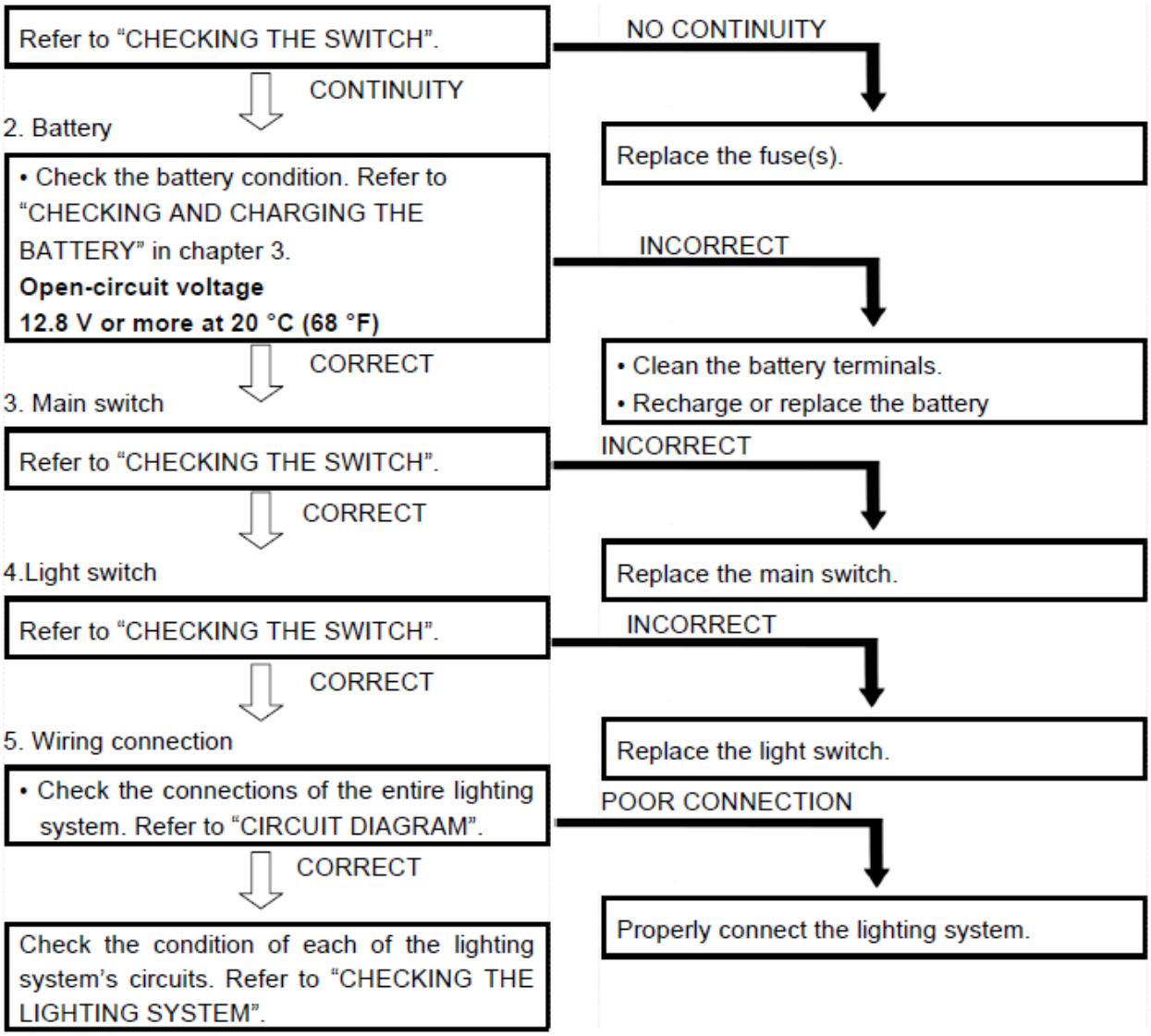
## Troubleshooting

### If the headlight or taillight fail to come on:

Check the following:

1. Fuses (main, lighting system)
2. Battery
3. Main switch
4. Light switch
5. Wiring connections (the entire lighting system)

1. **Fuses (main, lighting system)**


Refer to "CHECKING THE SWITCH".
NO CONTINUITY
CONTINUITY
Replace the fuse(s).
2. Battery
• Check the battery condition. Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.
Open-circuit voltage
12.8 V or more at 20 °C (68 °F)
INCORRECT
CORRECT
• Clean the battery terminals.
• Recharge or replace the battery
3. Main switch
Refer to "CHECKING THE SWITCH".
INCORRECT
CORRECT
Replace the main switch.
4.Light switch
Refer to "CHECKING THE SWITCH".
INCORRECT
CORRECT
Replace the light switch.
5. Wiring connection
• Check the connections of the entire lighting system. Refer to "CIRCUIT DIAGRAM".
POOR CONNECTION
CORRECT
Properly connect the lighting system.
Check the condition of each of the lighting system's circuits. Refer to "CHECKING THE LIGHTING SYSTEM".

## Checking the Lighting System

1. If the headlights fail to come on:

(1). Bulb and bulb socket

• Check the bulb and bulb socket for continuity.

NO CONTINUITY → Replace the bulb and/or bulb socket.

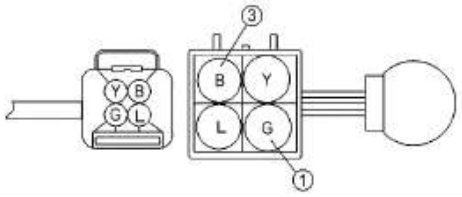
CONTINUITY

(2). Voltage

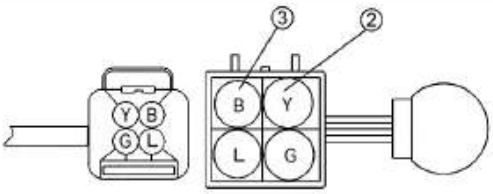
• Connect the pocket tester (DC 20 V) to the headlight couplers.
**Tester (+) lead →**
**Green terminal ① or Yellow terminal ②**
**Tester (–) lead → Black terminal ③**
Ⓐ When the light switch is on "".
Ⓑ When the light switch is on ""

• Turn the main switch to "ON".
• Turn the light switch to "" or "".
• Check the voltage (12 V) of the "Green" and "Yellow" leads on the bulb socket connector.

A




B




OUT OF SPECIFICATION → The wiring circuit from the main switch to the bulb socket connector is faulty, repair it.

MEETS SPECIFICATION → This circuit is not faulty.

**2. If the taillights fail to come on:**

(1). Bulb and bulb socket

- Check the bulb and bulb socket for continuity.

NO CONTINUITY → Replace the bulb and/or bulb socket.

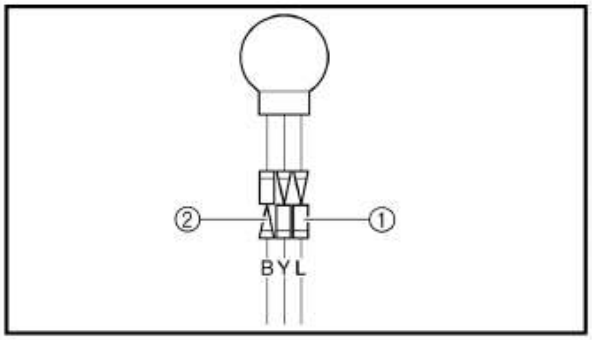
CONTINUITY ⇩

(2) . Voltage

- Connect the pocket tester (DC 20 V) to the tail/brake light couplers.

**Tester (+) lead → Blue lead terminal ①**

**Tester (–) lead → Black lead terminal ②**



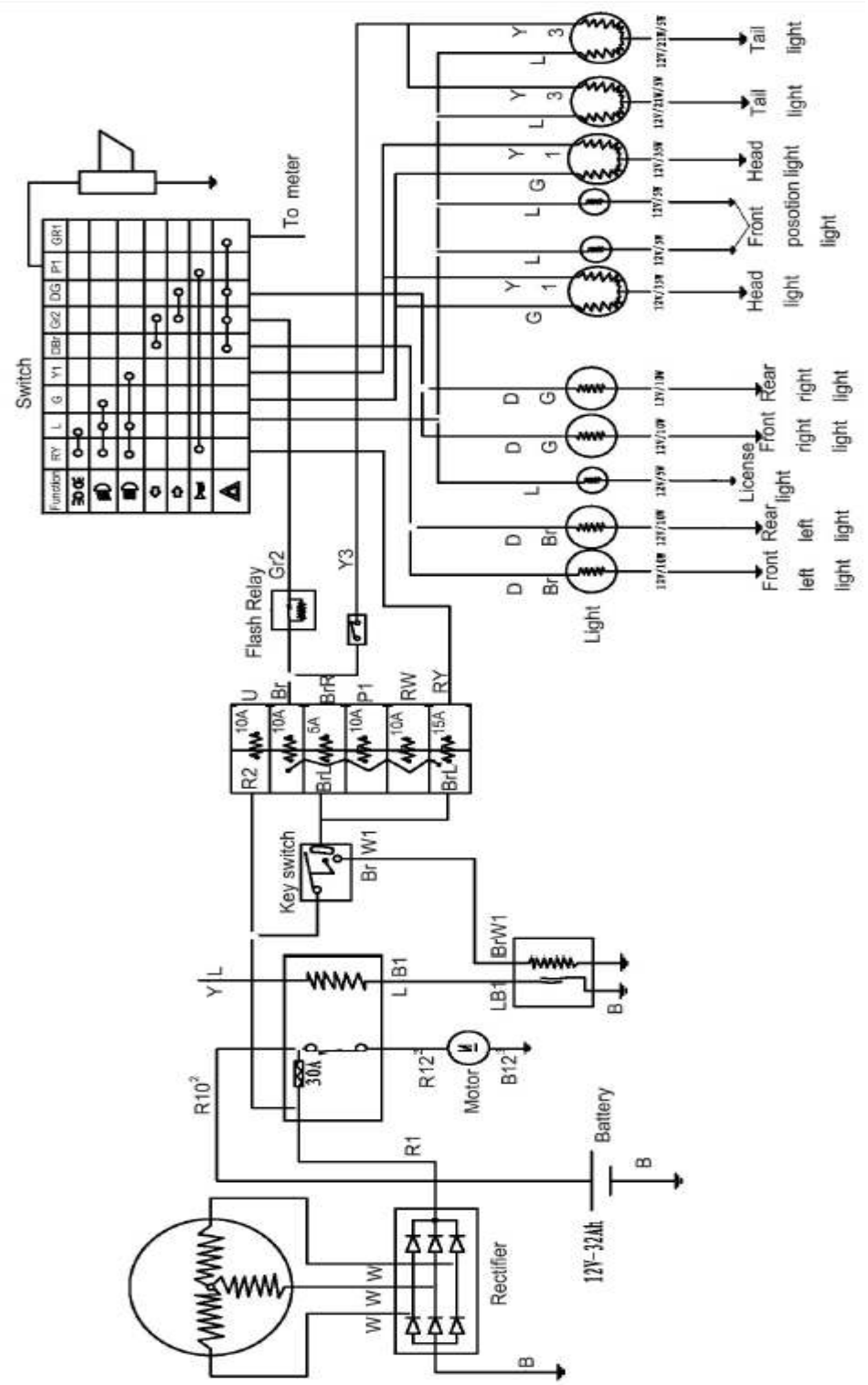

- Turn the main switch to "ON".
- Turn the light switch to "⇔" or "⇔".
- Check the voltage (12 V) of the "Blue" lead on the bulb socket connector.

OUT OF SPECIFICATION → The wiring circuit from the main switch to the bulb socket connector is faulty, repair it.

MEETS SPECIFICATION ⇩

This circuit is not faulty.

## Signaling System Circuit Diagram

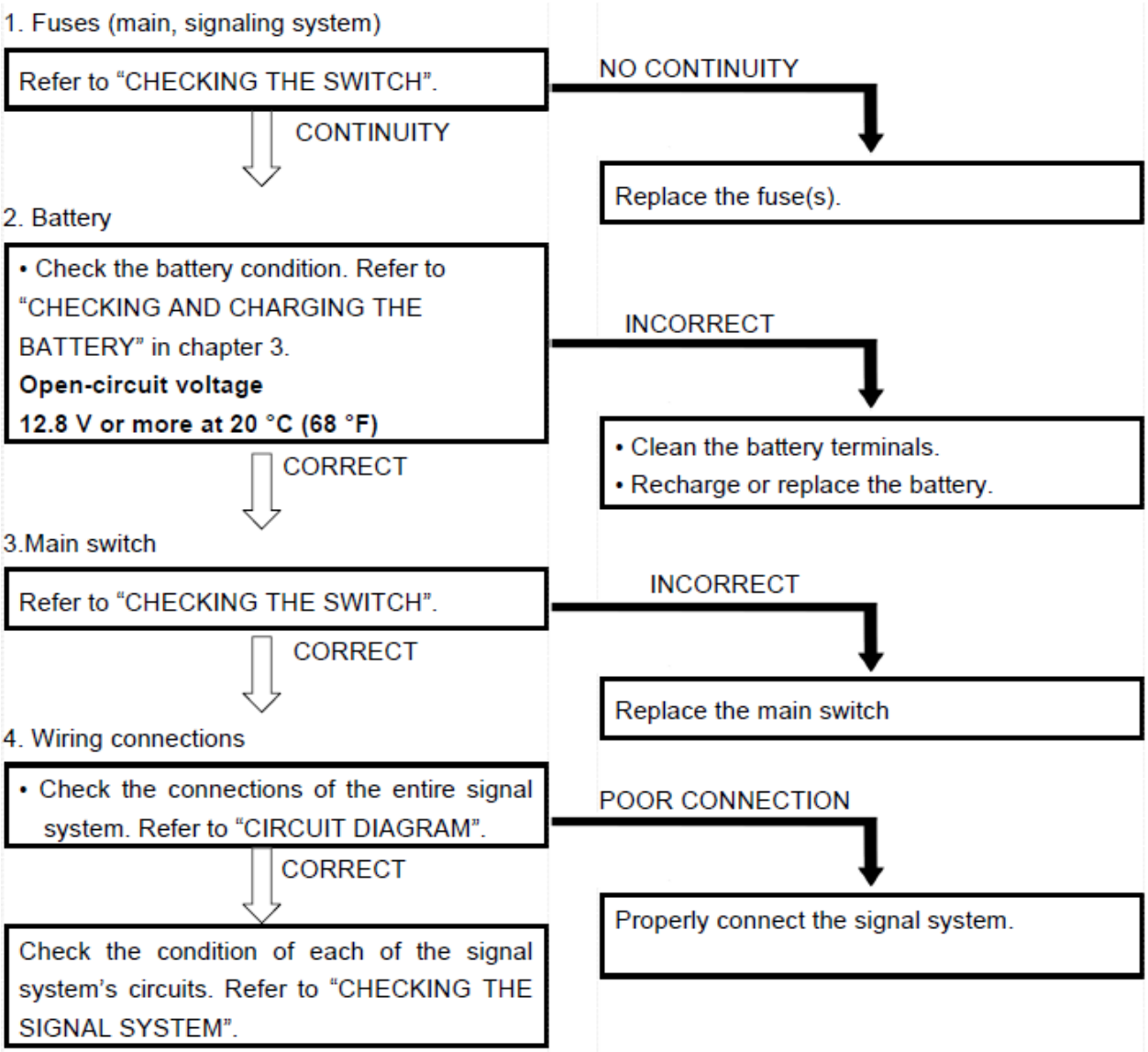


**Troubleshooting**

**If the Brake light and indicator light, or the warning light fails to come on:**

Check the following:

1. Fuses (main, signaling system)
2. Battery
3. Main switch
4. Wiring connections (the entire signal system)


1. Fuses (main, signaling system)
Refer to "CHECKING THE SWITCH".
NO CONTINUITY
CONTINUITY
Replace the fuse(s).
2. Battery
• Check the battery condition. Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.
Open-circuit voltage
12.8 V or more at 20 °C (68 °F)
INCORRECT
CORRECT
• Clean the battery terminals.
• Recharge or replace the battery.
3.Main switch
Refer to "CHECKING THE SWITCH".
INCORRECT
CORRECT
Replace the main switch
4. Wiring connections
• Check the connections of the entire signal system. Refer to "CIRCUIT DIAGRAM".
POOR CONNECTION
CORRECT
Properly connect the signal system.
Check the condition of each of the signal system's circuits. Refer to "CHECKING THE SIGNAL SYSTEM".

## Checking the Signal System

### 1. If the brake light fails to come on:

(1). Bulb and bulb socket

- Check the bulb and bulb socket for continuity.

NO CONTINUITY → Replace the bulb and/or bulb socket.

CONTINUITY ↓

(2). Bake light switch

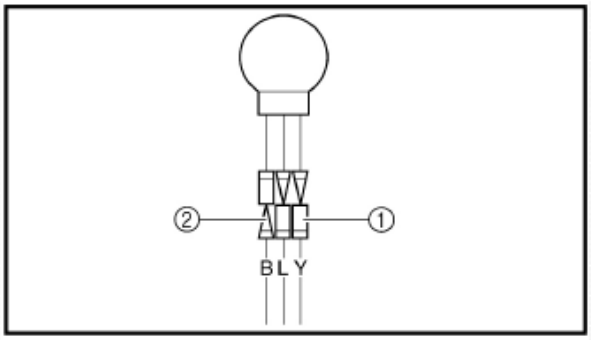
Refer to "CHECKING THE SWITCH".

NO CONTINUITY → Replace the brake light switch.

CONTINUITY ↓

(3). Voltage

- Connect the pocket tester (DC 20 V) to the bulb socket connector.
  **Tester (+) lead → Yellow terminal ①**
  **Tester (–) lead → Black terminal ②**




- Turn the main switch to "ON".
- Turn the light switch to "⏻" or "Ⓐ".
- Check the voltage (12 V) of the "Yellow" lead on the bulb socket connector.

OUT OF SPECIFICATION → The wiring circuit from the main switch to the bulb socket connector is faulty, repair it.

MEETS SPECIFICATION ↓

This circuit is not faulty.

**2. If the neutral light or reverse light fails to come on:**

(1). Gear position switch

Refer to "CHECKING THE SWITCH".

CONTINUITY

(2). Check the connection:

Check the connection between gear position switch and meter cable with multimeter.

Multimeter: ①and④

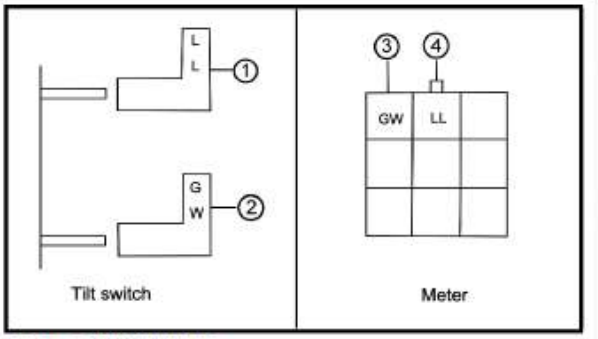
②and③

CONTINUITY

This circuit is not faulty.

NO CONTINUITY

Replace the gear position switch




NO CONTINUITY

Cable between tilt switch and meter need to repair

### 3. If the parking brake indicator light fails to come on:

(1). Parking brake switch

Refer to "CHECKING THE SWITCH".

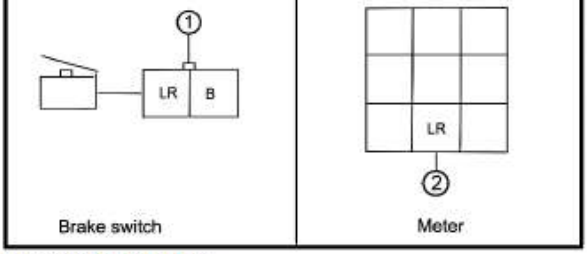
NO CONTINUITY → Replace the bulb and/or bulb socket.

CONTINUITY

(2). Check the connection:

Check the connection between brake switch and meter cable with multimeter

Multimeter: ① → ②




NO CONTINUITY → Cable between brake switch and meter need to repair

CONTINUITY

This circuit is not faulty.

**4. If the coolant warning light does not come on when the main switch is turned to "On", or if the coolant temperature warning light does not come on when the temperature is high (more than 117 – 123 º C (242.6 – 253.4º F).**

(1). Bulb and bulb socket

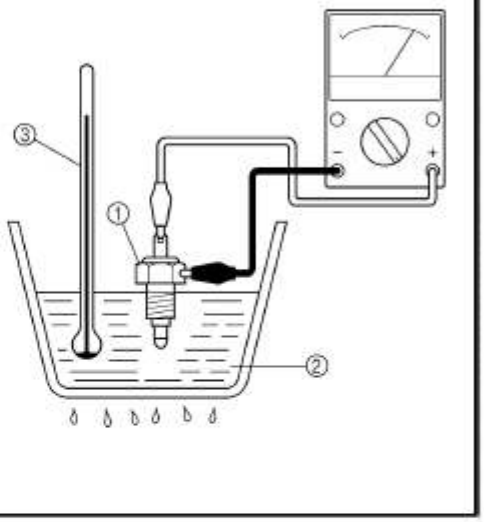
- Check the bulb and bulb socket for continuity.

NO CONTINUITY → Replace the bulb and/or bulb socket.

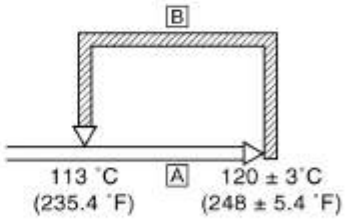
CONTINUITY ⇩

(2). Thermo switch 1

- Remove the thermo switch 1 from the cylinder head.
- Connect the pocket tester (Ω × 1) to the thermo switch 1 ①.
- Immerse the thermo switch 1 in coolant ②.
- Check the thermo switch 1 for continuity.
  While heating the coolant use a thermometer ③ to record the temperatures.
  Ⓐ The thermo switch 1 circuit is open and the coolant temperature warning light is off.
  Ⓑ The thermo switch 1 circuit is closed and the coolant temperature warning light is on.




| Test step | Coolant temperature | Continuity |
|---|---|---|
| 1 | Less than 120 ± 3 °C (248 ± 5.4 °F) | No |
| 2 | More than 120 ± 3 °C (248 ± 5.4 °F) | Yes |
| 3 | More than 113 °C (235.4 °F) | Yes |
| 4 | Less than 113 °C (235.4 °F) | No |




Test steps 1 & 2: Heating phase
Test steps 3 & 4: Cooling phase

**WARNING:**
**Handle the thermo switch 1 with special care.**
**Never subject it to a strong shock or allow it to be dropped. Should it be dropped, it must be replaced.**

BAD CONDITION → Replace the thermo switch 1

GOOD CONDITION ⇩

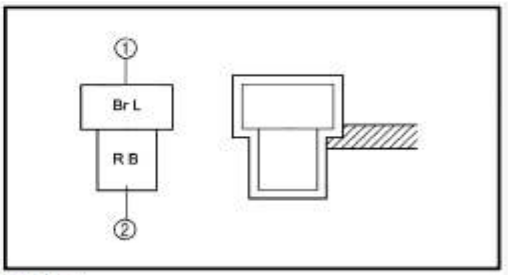
(3). Diode 2

• Remove the diode from the coupler
• Connect the pocket tester (Ω × 1) to the diode terminals as shown.
• Check the diode for continuity as follows:

| | |
|---|---|
| Tester(+) lead → Brown/Blue terminal ① Tester (–) lead → Red/Black terminal ② | Continuity |
| Tester (+)lead → Red/Black terminal ② Tester (–) lead → Brown/Blue terminal ① | NO Continuity |

CORRECT

This circuit is not faulty.




**NOTE:**

When you switch the tester's positive and negative probes, the readings in the left chart will be reversed.

INCORRECT

Replace the diode 2.

**5. If 4WD light or differential lock light does not come on:**

(1). Check the relay of 4WD light and differential lock light.

Press 4WD switch ②

Connect the brown-black wire to earth to see if the voltage will be 12V.

Press differential lock button ①

Connect the brown-yellow wire to earth to see if the voltage will be 12V.

If the voltage is not 12V

The relay is broken , change it .

If the voltage is 12V

The relay is in normal condition.

CONTINUITY

(2). Check 2/4WD switch.

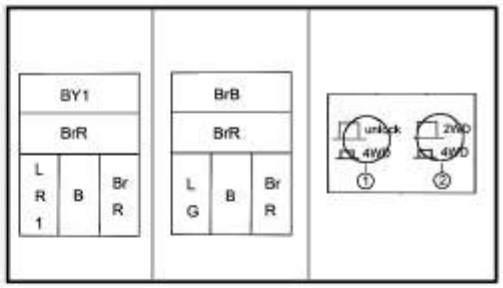
Press the switch repeatedly to see if it is normal.

The button cannot be hold In specified position.

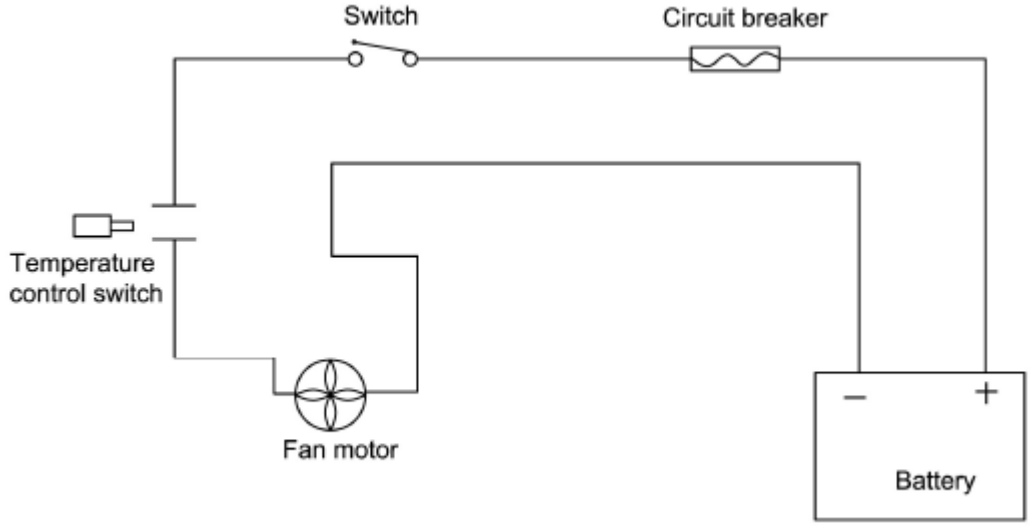
If the switch can be hold in specified position

2/4WD switch is broken, change it.

The 2/4WD switch is in normal condition.




## Cooling System Circuit Diagram



**Troubleshooting: The Fan Motor does not move.**

Check the following:

1. Fuse (main)
2. Battery
3. Main switch
4. Radiator fan motor
5. Thermo switch 3
6. Wiring connections (the entire cooling system)

1. Fuse (main)

Refer to "CHECKING THE SWITCH".

NO CONTINUITY → Replace the fuse.

CONTINUITY

2. Battery

• Check the battery condition. Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.
**Open-circuit voltage:**
**12.8 V or more at 20 °C (68 °F)**

INCORRECT → • Clean the battery terminals. • Recharge or replace the battery

CORRECT

3. Main switch

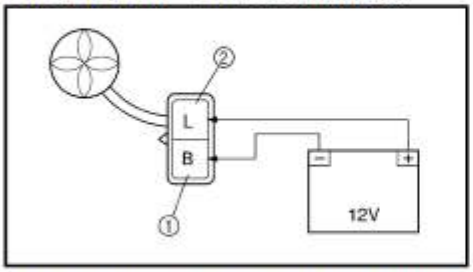
Refer to "CHECKING THE SWITCH".

INCORRECT → Replace the main switch.

CORRECT

4.Radiator fan motor

• Disconnect the radiator fan motor coupler.
• Connect the battery (12 V) as shown.
**Battery (+) lead → Blue terminal ②**
**Battery (–) lead → Black terminal ①**




• Check the operation of the radiator fan motor.

DOES NOT TURN → Replace the radiator fan motor.

5.Thermo switch 3

- Remove the thermo switch 3 from the radiator.
- Connect the pocket tester (Ω × 1) to the thermo switch 3 ①.
- Immerse the thermo switch 3 in coolant ②.
- Check the thermo switch 3 for continuity. While heating the coolant use a thermometer ③ to record the temperatures.

Ⓐ The thermo switch 3 circuit is closed.
Ⓑ The thermo switch 3 circuit is open.

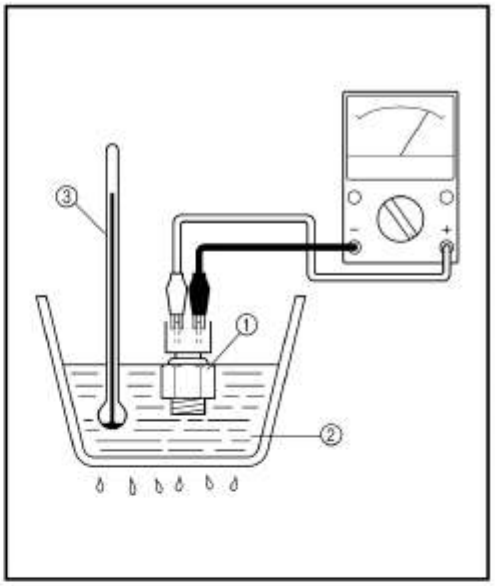
| Test step | Coolant temperature | Continuity |
|---|---|---|
| 1 | Less than 75±3 °C (167 ± 5.4 °F) | No |
| 2 | More than 75 ± 3 °C (167 ± 5.4 °F) | Yes |
| 3 | More than 68 °C (154.4 °F) | Yes |
| 4 | Less than 68 °C (154.4 °F) | No |

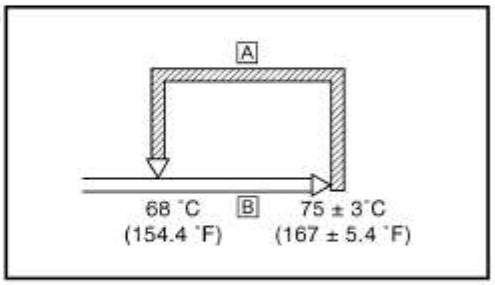
Test steps 1 & 2: Heating phase
Test steps 3 & 4: Cooling phase

**WARNING:**

**Handle the thermo switch 3 with special care.**
**Never subject it to a strong shock or allow it to be dropped. Should it be dropped, it must be replaced.**

Thermo switch 3
**28 Nm (2.8 m · kg, 20 ft · lb)**




BAD CONDITION → Replace the thermo switch 3

GOOD CONDITION

6. Wiring connection

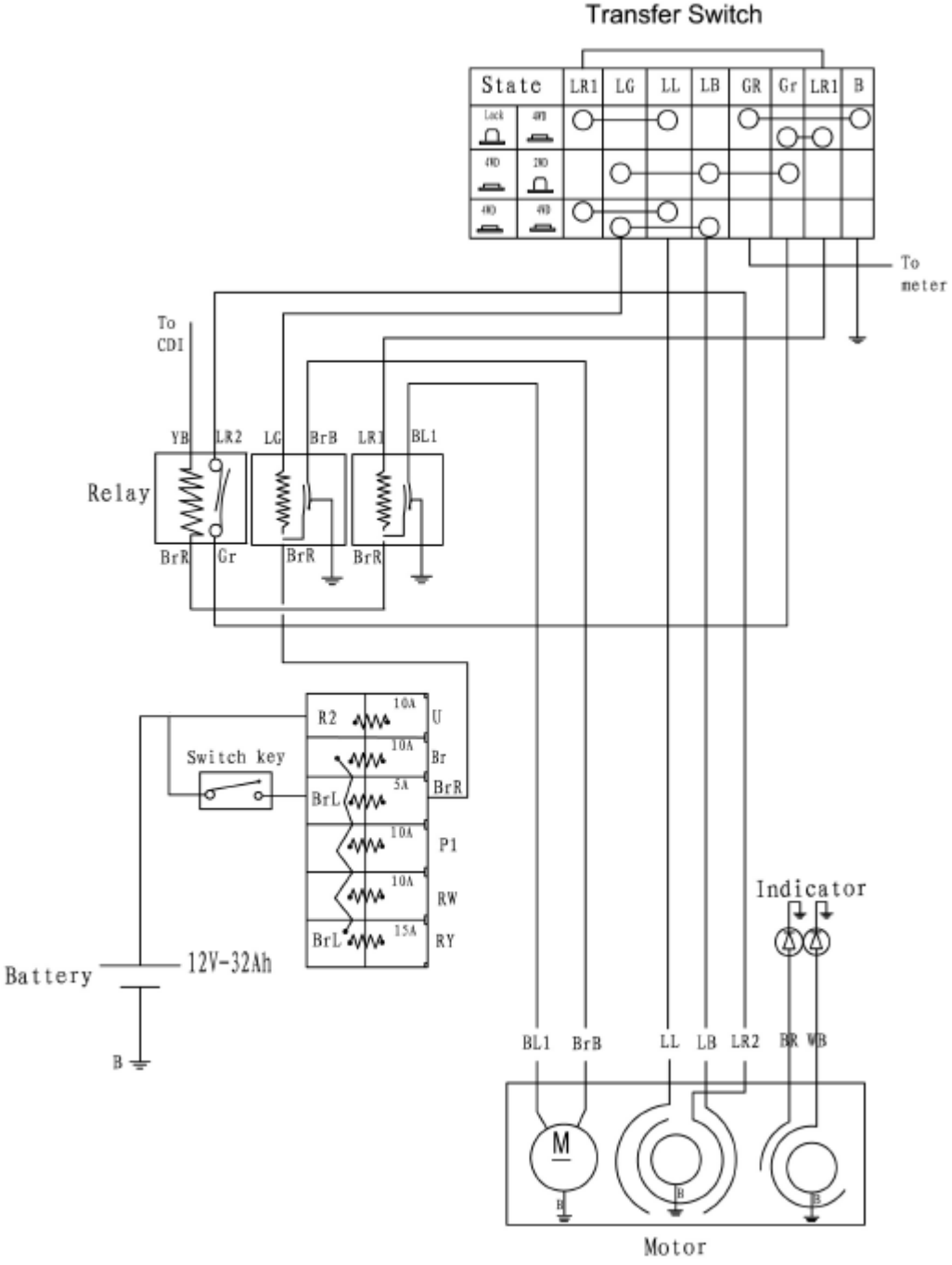
- Check the connections of the entire starting system. Refer to "CIRCUIT DIAGRAM"

POOR CONNECTION → Properly connect the cooling system.

CORRECT

This circuit is not faulty.

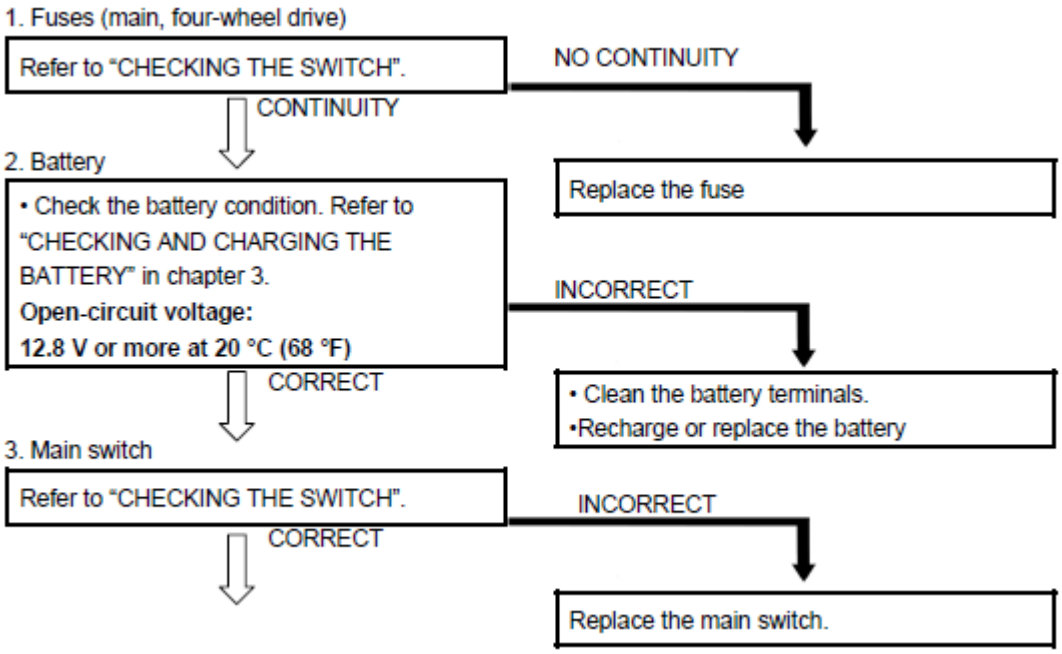
## 2WD/4WD Selecting System Circuit Diagram



**Troubleshooting: The 4WD indicator fails to come on:**

Check the following:

1. Fuses (main, four-wheel drive)
2. Battery
3. Main switch
4. Four-wheel drive relay 1
5. Four-wheel drive relay 2
6. Four-wheel drive relay 3
7. On-Command four-wheel drive switch and differential gear lock switch
8. Gear motor
9. Wiring connection (the entire 2WD/4WD selecting system)

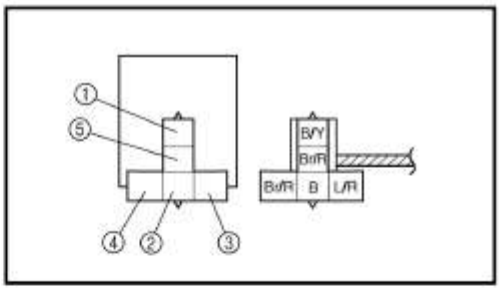


4. Four-wheel drive relay 1

- Remove the four-wheel drive relay 1 from the wire harness.
- Connect the pocket tester (Ω × 1) and the battery (12 V) to the four-wheel drive relay 1 terminals.

**Tester (+) lead → Black/Yellow terminal ①**
**Tester (–) lead → Black terminal ②**
Battery (+) terminal → Brown/Red terminal ③
Battery (–) terminal → Blue/Red terminal ④
**Tester (+) lead → Black/yellow terminal ①**
**Tester (–) lead → Brown/Red terminal ⑤**

- Check the four-wheel drive relay 1 for continuity.




NO CONTINUITY → Replace the four-wheel drive relay 1.

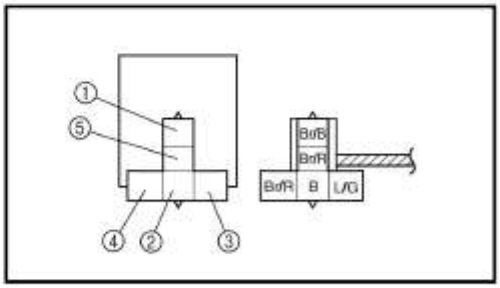
CONTINUITY

5. Four-wheel drive relay 2

- Remove the four-wheel drive relay 2 from the wire harness
- Connect the pocket tester (Ω × 1) and the battery (12 V) to the four-wheel drive relay 2 terminals.

**Tester (+) lead → Brown/Black terminal ①**
**Tester (–) lead → Black terminal ②**
Battery (+) terminal → Brown/Red terminal ③
Battery (–)terminal → Blue/Green terminal ④
**Tester (+) lead → Brown/Black terminal ①**
**Tester (–) lead → Brown/Red terminal ⑤**

- Check the four-wheel drive relay 2 for continuity




NO CONTINUITY → Replace the four-wheel drive relay 2.

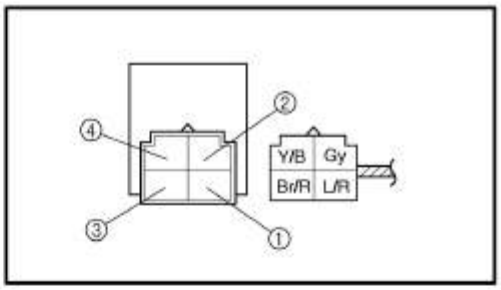
CONTINUITY

6. Four-wheel drive relay 3

- Remove the four-wheel drive relay 3 from the wire harness.
- Connect the pocket tester (Ω × 1) and the battery (12 V) to the four-wheel drive relay 3 terminals.

**Battery (+) terminal → Brown/Red terminal ①**
**Battery (–) terminal → Yellow/Black terminal ②**
**Tester (+) lead → Blue/Red terminal ③**
**Tester (–) lead → Gray terminal ④**

- Check the four-wheel drive relay 3 for continuity.




NO CONTINUITY → Replace the four-wheel drive relay 3.

CONTINUITY

7. On-Command four-wheel drive switch and differential gear lock switch

Refer to "CHECKING THE SWITCH".

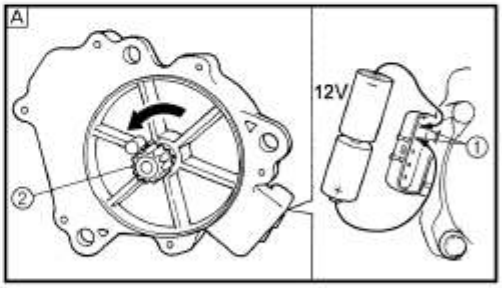
INCORRECT → Replace the On-Command four-wheel drive switch and differential gear lock switch.

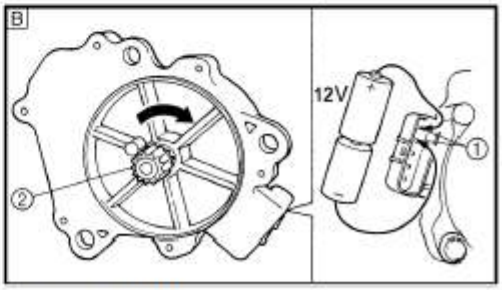
CORRECT

8. Gear motor

- Disconnect the gear motor coupler.
- Remove the gear motor from the differential gear case. Refer to "FRONT CONSTANT VELOCITY JOINTS, DIFFERENTIAL GEAR AND DRIVE SHAFT" in chapter 3.
- Connect two C size batteries to the gear motor terminals ① (as shown illustrations).

A Check that the pinion gear ② turns counterclockwise.
B Check that the pinion gear ② turns clockwise.



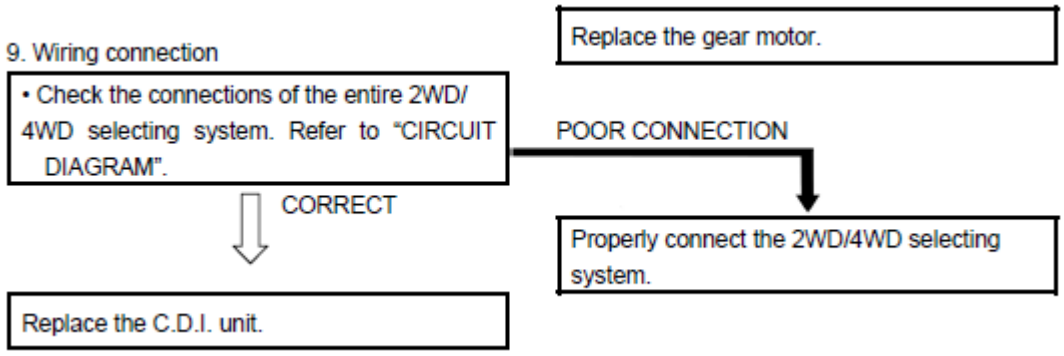




- Make sure that the drive gear (shift fork sliding gear) operates correctly.

**NOTE:**
**When installing the differential gear case in the gear motor, refer to "FRONT CONSTANT VELOCITY JOINTS, DIFFERENTIAL GEAR AND DRIVE SHAFT" in chapter 3.**

INCORRECT

CORRECT


9. Wiring connection
• Check the connections of the entire 2WD/ 4WD selecting system. Refer to "CIRCUIT DIAGRAM".
POOR CONNECTION
Replace the gear motor.
CORRECT
Properly connect the 2WD/4WD selecting system.
Replace the C.D.I. unit.

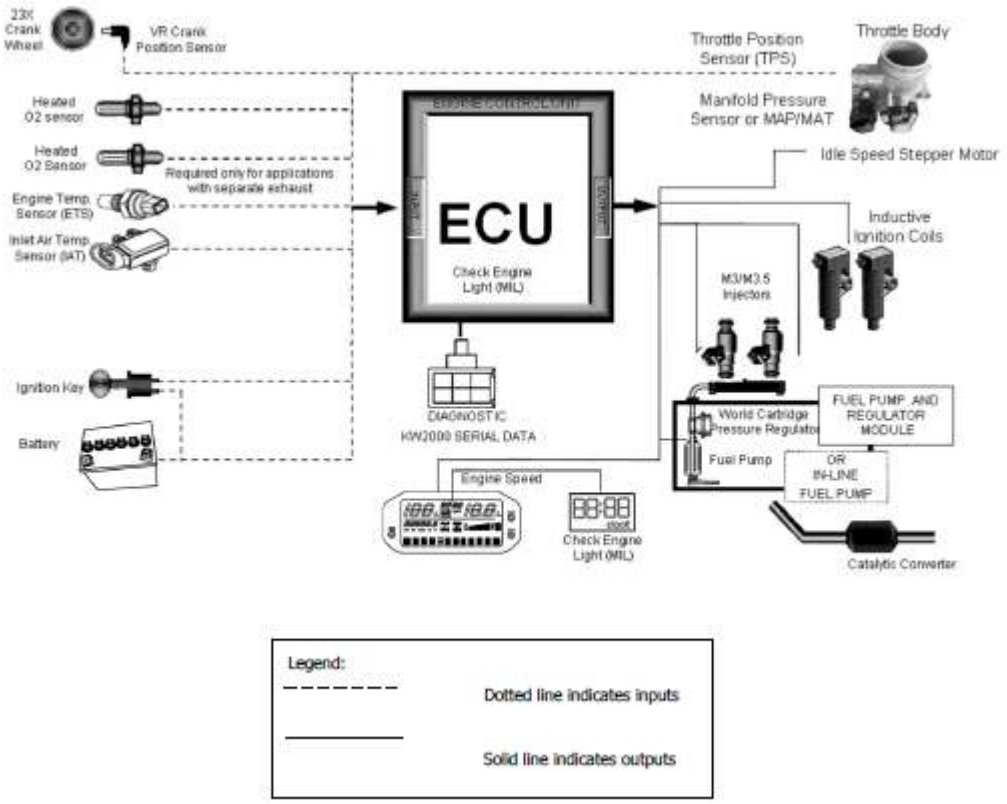
**TROUBLESHOOTING**

**1. Check if the 2/4WD switch is working.**

- Turn on the switch, put the gear to position N; keep front and rear wheel off the ground , and then roll the front wheel to see if the rear wheel moves together with it or if it turns alone..
- If the wheels are not locked together, please check the electrical circuits with a multimeter, if there is no power, please check the fuse.

**2. Check if the rear differential is working.**

- Check the sound. When the switch is turned on, the magneto valve will make a sound to show that it is engaging and disengaging, and the rear wheel won't be able to rotate in the same direction.
- If no sound is made, check if the controller of magnetic valve has a output of 12V electricity, and check if the magnetic valve has a input of 12V electricity, if it has the input, it means the valve doesn't work, please change for a new one ; if not , please check the input end of controller to see if it has power, if it does, change it out for a new controller, if not , check the fuse.





| | | | |
|---|---|---|---|
| **EMS Introduction, Components** | **7-3** | **Throttle Body assembly** | **7-7** |
| **Layout** | **7-4** | **Engine coolant temperature sensor, Oxygen sensor** | **7-8** |
| **ECU** | **7-4** | **Fuel Pump Module** | **7-9** |
| **Multec 3.5 Injectors** | **7-5** | **Fault Codes** | **7-12** |

## Introduction

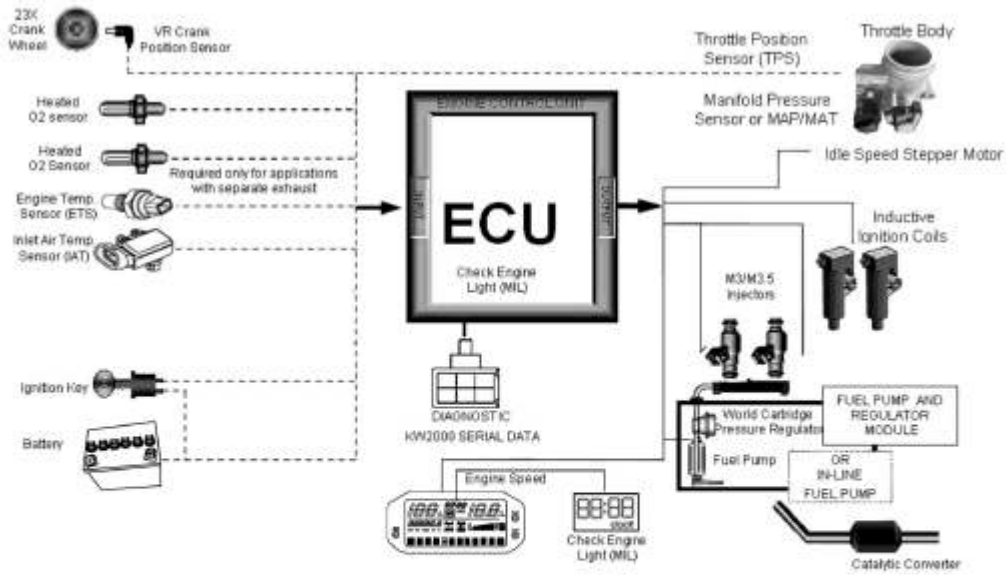
### EMS (Engine Management System)

EMS is a self contained set of components including a custom built computer, sensors, and actuators which control the operation of an engine by monitoring the engine speed, load and temperature. While doing that it also provides the ignition spark at the right time for the prevailing conditions and metering the fuel to the engine in the exact quantity required.

### Typical Components of EMS

1. Electronic Control Unit
2. Multec 3.5 Injectors
3. Throttle Body Assembly (with stepper motor)
4. Engine Coolant Temperature Sensor
5. Intake Air Pressure and Temperature Sensor
6. Oxygen Sensor
7. Ignition Coil
8. Fuel Pump Module

## Layout of EMS Components




**Components of EMS**

### Electronic Control Unit

The ECU continuously monitors the operating conditions of the engine through the system sensors. It also provides the necessary computation, adaptability, and output control in order to minimize the tailpipe emissions and fuel consumption, while optimizing vehicle drivability for all operating conditions. The ECU also provides diagnosis when system malfunctions occur.

Installation requirements

The ECU shall be mounted using M5 machined screws with a torque of 3.9Nm ± 10%. The mounting surface should also be flat to avoid subjecting the base plate to unnecessary force or warping the printed circuit board.

**Maintenance service and Repair**

ECU is a non-serviceable part. Once there are problems, it's important to first determine if the problem is caused by software/calibration. If it is caused by software/calibration, please refer to software/calibration, reflashing procedure. In the event of ECU hardware failure or malfunction (during warranty period only) the ECU should be sent back to the vehicle manufacturer giving complete details of the ECU Part No, Serial number, Vehicle Model & Make, manufacturing Date,
Total kms or miles on the vehicle, Location of use, Vehicle No, Date of return.

**ECU Handling**

**Do Not**

- Place the ECU close to any exhaust pipe or heat source when removed. Excessive heat could reduce the lifespan of the ECU.
- Allow water, oil or any other liquids close to the ECU. This is an electrical component that is easily damaged by fluids.
- Allow mud or debris to accumulate on the surface of the ECU. Because it is a closed electrical unit mud or debris will cause excessive heat and adversely affect the ECU.
- Clean with any solvent or corrosive liquid as this will damage the housing of the ECU.

Take extreme care of the ECU as this is the brain for the system functioning properly is critical to the running of the UTV.

**Multec 3.5 Injectors**

The Multec 3.5 Fuel Injector is an electromechanical device. A magnetic field is generated as voltage is applied to the solenoid coil. The resulting magnetic force lifts the core assembly, overcoming manifold vacuum, spring force, and fuel pressure, allowing fuel to pass through the ball and seat interface to the director.
As the fuel passes through the director, an atomized spray is developed. The injector closes when the voltage is removed, cutting off the fuel flow.

**Fuel Injector Handling**

**Do Not**

- Reuse injector seal rings.
- Dip injectors into lubricants
- Cycle injectors repeatedly without fuel pressure.
- Actuate a suspected high leak rate injector.
- Allow water to enter the fuel system from air lines during leak checks.
- Contact or apply load to the injector tip during installation.
- Pound injectors into the manifold during assembly.
- Do not use a dropped injector.
- Replace the injector with any other part number not recommended for this application.

**Installation**

Follow these guidelines to prevent damage to the injector and its electrical interface during the replacement or re-installation process.

Lubrication: Apply a light coating of lubricant to the lower injector seal ring. ISO 10 light mineral oil or equivalent is recommended.

The preferred technique is to apply the lubricant to the sockets the injectors are being installed into, rather than directly to the seal ring itself. This will help minimize the possibility of injector contamination.

Avoid applying lubricant over the director plate holes – this may restrict injector flow. Do not dip the injector tip in lubricant.

Multec 3.5 injectors come from the factory with the seal rings attached. The re-use of seal rings is not preferred when replacing an injector. If an injector is to be re-used, and no new seal rings are available, take care to inspect each seal ring for signs of damage. Even minor defects in the seal ring can lead to leakage. Take extra care in installing seal ring over flange of injector inlet.

Carefully installing the harness connector will prevent terminal damage. Listen for a positive audible click from the connector retention device — this ensures that it is fully engaged.

Disconnect negative battery cable to avoid possible fuel discharge if an accidental attempt is made to start the engine.

Disconnect the electrical connector from the injector wiring harness.

Relieve fuel pressure.

Remove the retaining clip from the fuel injector.

Remove the fuel line connection from the injector.

Carefully clean debris from the mating surfaces.

Remove the injector from the manifold.

Apply a light coating of a lubricant to both the upper and lower injector seal ring of the replacement injector.

Install the new injector into the manifold. Check that the injector is installed in the original orientation to maintain proper spray targeting, and that the retaining clip is properly seated on the injector and the fuel line.

Install the retaining clip after connecting the fuel line.

Tighten the injector mounting to the desired torque as mentioned in the manufacturer manual.

Tighten the fuel line.

Re-install the injector electrical connector.

Check for fuel leaks with the key “on” and the engine “off”.

Start engine and verify proper operation, and spray pattern, do not rotate the injector in the fuel rail assembly to install the injector electrical connector. This may dislodge the retaining clip, and result in improper spray orientation.

**Plugging**

Fuel deposits cause plugging.

Plugging can cause flow restrictions, frictional changes and the collection of other particles attracted by the tacky surface. The flow restrictions can degrade emissions and drivability.

Other fuel and environmental conditions may cause crystal or corrosion growth in the injector and cause a shift in flow.

Oxidation stability of the gasoline affects the potential for deposit formation and must be controlled by the fuel supplier.

Increased levels of detergent additives reduce the rate of injector plugging.

**Cleaning Procedure**

Electrically disable the fuel pump by removing the fuel pump connection.

Relieve the fuel pressure in the system and disconnect the fuel connection at the injector. Plug the fuel feed line.

Injector cleaner with the specific ratio of the cleaner and gasoline to be mixed in the Injector cleaning tank.

Connect the injector-cleaning tank to injector in the vehicle.

Pressurize the injector-cleaning tank to system pressure.

Start and idle the engine for 15- 20 minutes.

Disconnect the injector-cleaning tank from the system and install the fuel pump connections. Connect the fuel feed line to injector.

Start and idle the vehicle for an additional 2 minutes to ensure the residual injector cleaner is flushed from system.

**Throttle Body Assembly(with stepper motor)**

The throttle body and sub assemblies are responsible for controlling intake air flow, Idle air flow, and to sense throttle position.

**Throttle Body Removal**

Disconnect negative terminal of the battery.

Disconnect electric lead wire of throttle position sensor coupler, stepper motor coupler and MAP/MAT sensor coupler (if this sensor is mounted on the throttle body).

Disconnect accelerator cable from throttle body.

Remove air cleaner outlet hose and throttle body outlet hose.

**Cleaning Procedure**

If there is a cover on the bottom, it may be removed and cleaned using carburetor cleaner (3M make recommended). Once the throttle body cover is removed, spray the throttle-body cleaner inside the shipping air passage, and use a brush to gently dislodge the dirt, gum and varnish that are present. Do not let the by-pass holes be blocked by dirt or foreign particles.

**Throttle Body Installation**

Reverse the procedure for installation noting the following:

Adjust accelerator cable play.

Check to ensure that all removed parts are back in place.

**Precautions**

Do not submerge TPS in any cleaning fluid.

Always open the throttle valve using the throttle cable or lever.

Do not hold the valve at opening position by inserting tools or any sticks into the bore. The valve may be warped and the bore may be scratched. This type of damage may keep the throttle from opening easily or fully closing.

**Engine Coolant Temperature Sensor**

This sensor is used in water cooled engines. It provides a resistance that varies as a function of temperature within prescribed tolerance limits. The sensor has a negative temperature coefficient of resistance. This is a non-serviceable part.

**Installation Requirements**

The sensor shall be installed by hand and torqued to recommended torque specification.

**20-25 Nm or 14-18 ft lbs**

**Intake Air Pressure and Temperature Sensor**

This sensor has two functions. The first is the intake manifold air temperature, it provides a resistance that varies as a function of temperature within prescribed tolerance limits.
The second is the intake manifold air pressure; it provides a voltage that varies according to the intake air pressure.

**Oxygen Sensor**

This sensor is a device for monitoring the residual oxygen in the exhaust of an internal combustion engine. It consists of the wide range sensor and stoichiometric sensor. Usually we use a stoichiometric sensor on small engines. It is the feedback element for engine closed loop control.

**Installation Requirements**

Mounting Angle with Level: ≥10 degree

Torque **40-60 Nm or 29-44 ft lbs**

**Ignition Coil**

This coil provides energy to the spark plug in the combustion chamber. The coil itself doesn't have a driver. The high voltage tower of the coil is connected to the spark plug using a high voltage cable assembly. This is a non-serviceable component.

**Installation requirements**

The vehicle frame provides the mounting surface and mounting holes. Mount coil close to the spark plug and keep the plug wire length very short (less than 6 “).

Mount coil away from any pick up device. Especially, a VR type Crank / Cam sensor.

Keep a Min distance of 150 mm (around 6”) between coil and any VR sensor device.

Never route the coil C- wire with the same bundle as the Crank sensor wires. There is around 200 peak voltage potential between C- wire and engine ground. This voltage potential could cause a noise on sensor cables

**Fuel Pump Module**

Fuel Pump Module supplies fuel to engine at system pressure. The Fuel Pump Module is mounted in the fuel tank and supplies fuel to engine through hoses. The Fuel Pump module consists of Fuel Pump to generate the fuel flow and a pressure regulator to regulate the fuel pressure.

Fuel Pump

When power is supplied to the fuel pump, the motor in the pump assembly rotates the impeller. Impeller in turn draws the fuel from strainer and pumps the flow to generate the system pressure.

Pressure Regulator

Pressure Regulator is a diaphragm type mechanical device. Fuel flow from filter enters in the inlet of the pressure regulator, it then regulates the fuel pressure at a set pressure by releasing the excessive fuel flow back into the fuel tank.

**Service Procedure:**

Before attempting any service on fuel system, the following cautions should be followed for personal safety and to avoid system damage.

Disconnect negative cable at battery.

DO NOT smoke, and place ‘No SMOKING” sign near work area.

Make sure to have fire extinguisher handy.

Make sure to perform work in well ventilated area and away from any open fire/flames.

Wear Safety glasses

To relieve fuel vapor pressure in fuel tank, remove fuel filler cap fuel filler neck and then reinstall it.

As fuel lines are at high pressures when the engine is stopped, loosening or disconnecting the fuel line will cause a dangerous spout of fuel. Before loosening/ disconnecting fuel lines, please follow the “Fuel Pressure Relief Procedure” described in this section.

A small amount of fuel may drip after the fuel lines are disconnected. In order to reduce the risk of personal injury, cover the pipe/ hose ends with suitable bind with no rust or contamination.

After servicing, make sure that the fuel hoses and clamps are connected according to the hose fitment instructions given in vehicle instruction manual.

After servicing, please follow the ‘Fuel Leakage Check Procedure’ described in this section.

After servicing make sure to fill at least 3 liters gasoline before pump is primed (ignition key should be turned on only after ensuring there is minimum 3 liters of fuel in the fuel tank).

**Fuel System Diagnosis**

| Step | Action | Yes | No |
|---|---|---|---|
| **1** | Switch on Ignition key. Fuel Pump primes for 3 seconds when the ignition key is ON. Check for fuel pump running noise for 3 seconds after ignition key is ON. | If fuel pump running noise can be heard, go to step 4. | If fuel pump running noise can not be heard, go to step 2. |
| **2** | Disconnect fuel module coupler. Check voltage at the harness coupler. Is the voltage within 10-14V ? | Go to step 3 | Check the electrical circuit from Ignition to fuel module. |
| **3** | Connect 12V DC power supply (battery) to fuel module. Make sure that enough fuel available in fuel tank to avoid fuel pump running dry. Is the fuel pump running | 1. Check electrical circuit from fuel module to ECU<br>2. Check ECU | 1. Check Fuel Pump Harness Integrity<br>2. Check Fuel Pump |
| **4** | Check fuel system pressure at Injector inlet (with a T-joint) while engine is running in idle condition. Is the pressure between 220-270kPa? | Fuel Module Operation Normal | Go to Step 5 |
| **5** | Is the Pressure below 220kPa? | 1. Check for leaks from hoses hose joints<br>2. Check Fuel Pump<br>3. Check Pressure Regulator | 1. Clogged Filter<br>2. Kink or Blockage in Fuel Hoses<br>3. Check Regulator |

**Fuel Module Removal:**

Relieve fuel pressure in fuel lines referring to the 'Fuel Pressure Relief Procedure' provided in this section.

Disconnect negative cable at battery.

Disconnect fuel module wire coupler.

Disconnect the fuel hoses from fuel module by using standard tools.

Turn the screw cap and remove the fuel module assembly with care not to damage the fuel level sending unit.

**Fuel Module Installation:**

Reverse the removal method for installation.

Fill the fuel tank with at least 3 liters of fuel before turning on the ignition switch to prime the lines.

**Fuel Pressure Relief Procedure:**

Place vehicle gear in 'Neutral'.

Disconnect fuel module electrical coupler from vehicle harness.

Start engine and run till it stops due to lack of fuel. Repeat ignition key ON and OFF for 2 ~ 3 times of about 3 seconds each time to relieve fuel pressure in lines. Fuel Connections are now safe for servicing.

Upon the completion of servicing, Connect Fuel Module Connector to Vehicle Harness.

**Fuel Leakage Check Procedure:**

After performing any service on fuel system, check to make sure that there are no fuel leaks as below.

Fill about 3 ~ 5 liters of fuel in tank.

Turn Ignition key to ON position for 3 seconds (to operate fuel pump) and then it turn to the OFF position. Repeat this for 3 ~ 4 times to apply fuel pressure in fuel lines.

In this state, check to see that there are no fuel leaks from any part of fuel system (Fuel Tank, Hoses, Hose Joints, etc).

**Fuel Module Handling**

This is a very delicate assembly use caution when handling to avoid any damage.

## EMS FAULT DIAGNOSIS

When fault codes are triggered, the odometer's clock will turn into a number， which is a fault code, find out the cause with this number, press clock button then it will turn back to clock mode, and five seconds later, the fault code will show again.

### Fault Code List

| System or Component | DTC Number | DTC Description | Related Calibration |
|---|---|---|---|
| Manifold Absolute Pressure Sensor (MAP) | 0107 | MAP Circuit Low Voltage or Open | KsDGDM_MAP_ShortLow |
| | 0108 | MAP Circuit High Voltage | KsDGDM_MAP_ShortHigh |
| Intake Air Temperature Sensor (IAT) | 0112 | IAT Circuit Low Voltage | KsDGDM_IAT_ShortLow |
| | 0113 | IAT Circuit High Voltage or Open | KsDGDM_IAT_ShortHigh |
| Coolant/Oil Sensor | 0117 | Coolant/Oil Temperature Sensor Circuit Low Voltage | KsDGDM_CoolantShortLow |
| | 0118 | Coolant/Oil Temperature Sensor Circuit High Voltage or Open | KsDGDM_CoolantShortHigh |
| Throttle Position Sensor (TPS) | 0122 | TPS Circuit Low Voltage or Open | KsDGDM_TPS_ShortLow |
| | 0123 | TPS Circuit High Voltage | KsDGDM_TPS_ShortHigh |
| Oxygen Sensor | 0131 | O2S 1 Circuit Low Voltage | KsDGDM_O2_1_ShortLow |
| | 0132 | O2S 1 Circuit High Voltage | KsDGDM_O2_1_ShortHigh |
| Oxygen Sensor Heater | 0031 | O2S Heater Circuit High Voltage | KsDGDM_O2_HeaterShortHigh |
| | 0032 | O2S Heater Circuit Low Voltage | KsDGDM_O2_HeaterShortLow |
| Fuel Injector | 0201 | Injector 1 Circuit Malfunction | KsDGDM_INJ_CYL_A_Fault |
| | 0202 | Injector 2 Circuit Malfunction | KsDGDM_INJ_CYL_B_Fault |
| Fuel Pump Relay (FPR) | 0230 | FPR Coil Circuit Low Voltage or Open | KsDGDM_FPP_CircuitShortLow |
| | 0232 | FPR Coil Circuit High Voltage | KsDGDM_FPP_CircuitShortHigh |
| Crankshaft Position | 0336 | CKP Sensor Noisy Signal | KsDGDM_CrankNoisySignal |
| Sensor (CKP) | 0337 | CKP Sensor No Signal | KsDGDM_CrankNoSignal |
| Ignition Coil | 0351 | Cylinder 1 Ignition Coil Malfunction | KsDGDM_EST_A_Fault |
| | 0352 | Cylinder 2 Ignition Coil Malfunction | KsDGDM_EST_B_Fault |
| Idle Control System | 0505 | Idle Speed Control Error | KsDGDM_IdleControl |

## **Fault Code List** (Con't)

| | | | |
|---|---|---|---|
| **System Voltage** | 0562 | System Voltage Low | KsDGDM_SysVoltLow |
| | 0563 | System Voltage High | KsDGDM_SysVoltHigh |
| **MIL** | 0650 | MIL Circuit Malfunction | KsDGDM_MIL_Circuit |
| **Tachometer** | 1693 | Tachometer Circuit Low Voltage | KsDGDM_TAC_Circuit_Low |
| | 1694 | Tachometer Circuit High Voltage | KsDGDM_TAC_Circuit_High |
| **Oxygen Sensor 2** | 0137 | O2S 2 Circuit Low Voltage | KsDGDM_O2_2_ShortLow |
| | 0138 | O2S 2 Circuit High Voltage | KsDGDM_O2_2_ShortHigh |
| **Oxygen Sensor Heater 2** | 0038 | O2S Heater 2 Circuit High Voltage | KsDGDM_O2_HeaterShortHigh |
| | 0037 | O2S Heater 2 Circuit Low Voltage | KsDGDM_O2_HeaterShortLow |
| **Vehicle Speed Sensor** | 0500 | VSS No Signal | KsDGDM_VSS_NoSignal |
| **Park Neutral Switch Diag** | 0850 | Park Neutral Switch Error | KsDGDM_ParkNeutralSwitch |
| **CCP** | 0445 | CCP short to high | KsDGDM_CCP_CircuitShortHigh |
| | 0444 | CCP short to low/open | KsDGDM_CCP_CircuitShortLow |
| **BLM MaxAdapt** | 0171 | BLM Max Adapt(Kohler Special) | KsFDIAG_BLM_MaxAdapt |
| **BLM MinAdapt** | 0172 | BLM Min Adapt(Kohler Special) | KsFDIAG_BLM_MinAdapt |
| **PE system Lean** | P0174 | PE syst Lean(Kohler Special) | KsFDIAG_PESystLean |

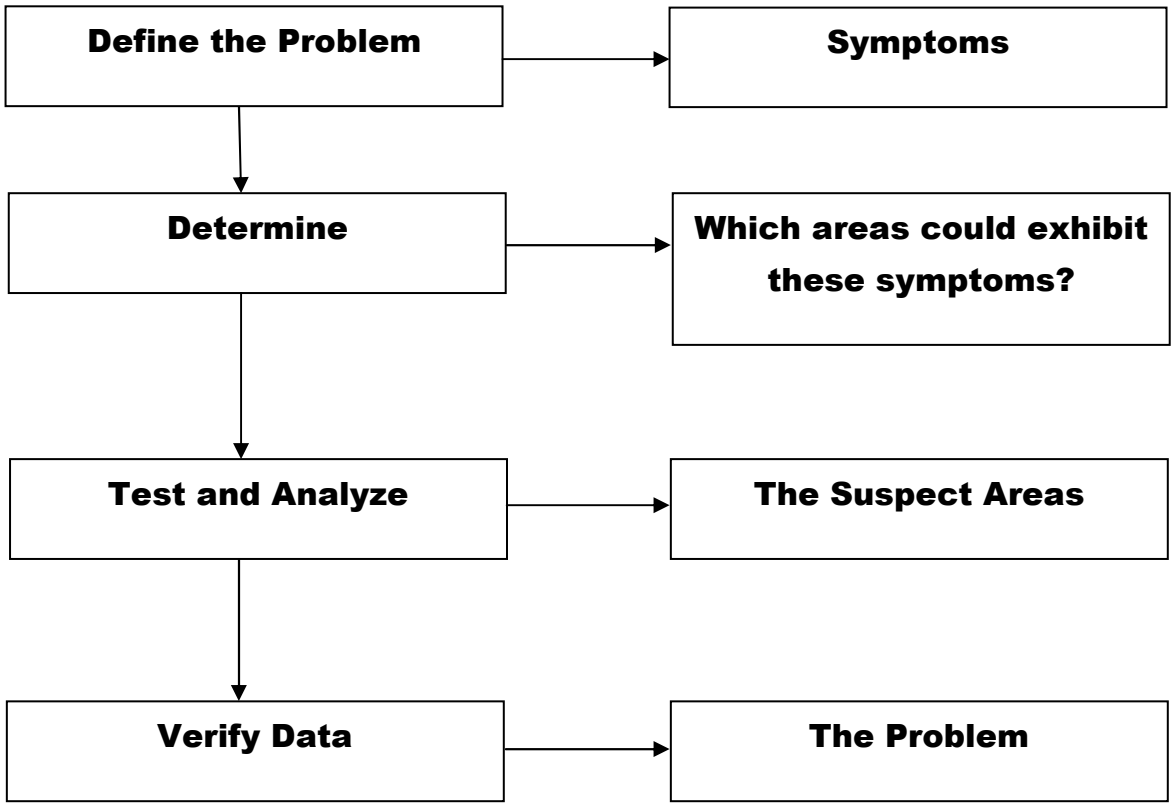
# Troubleshooting

? ? ?


| | | | |
|---|---|---|---|
| **Diagnosing electrical or mechanical problems** | **8-3** | **Cylinder Leak Down Test** | **8-8** |
| **Spark test** | **8-4** | **Electrical Testing, Preliminary checks and precautions** | **8-10** |
| **Fuel System** | **8-5** | **Intermittent Problems** | **8-11** |
| **Preignition, Detonation and engine noises** | **8-7** | **Ecu** | **8-12** |

# Troubleshooting

Diagnose electrical and Mechanical problems by using a systematic approach and remembering basic operating requirements.




By following a systematic approach, the possibility of unnecessary parts replacement can be avoided, always start with the simple and most obvious checks when troubleshooting, This would include the engine stop switch, fuel quantity and condition, fuel vale position and spark plug cap tightness. Proper maintenance as described in Chapter Three reduces the necessity for troubleshooting. Even with the best of care, however, the UTV may develop problems that require troubleshooting.
If the problem cannot be solved, Stop and evaluate all conditions prior to the problem. If the UTV must be taken to a repair facility, the mechanic will want to know as many details as possible. For removal, installation and test procedures of some components, refer to the specific chapter.

# Troubleshooting

When Troubleshooting or diagnosing a problem on a UTV, it is always good to use a systematic approach to solving the issue. There are 3 main things to look for to have a running motor.

- A Fuel air mixture being delivered to the cylinder.
- Compression inside the cylinder
- A timed spark to ignite the compressed fuel air mix.

Without any one of these the combustion process cannot take place.

Before any testing, be sure you have a known good battery source.

**Spark Test**

Perform a spark test to determine if the ignition system is producing adequate spark. This test should be performed with a spark tester. A spark tester looks like a spark plug with an adjustable gap between the center electrode and grounded base. Because the voltage required to jump the spark tester gap is sufficiently larger than that of a normally gapped spark plug, the test results are more accurate than with a spark plug. Do not assume that because a spark jumped across a spark plug gap, the ignition system is working correctly. Perform this test on the engine when it is both cold and hot, if possible. If the test results are positive for each test, the ignition system is working correctly.

***Caution:***
***After removing the direct ignition coil or spark plug cap and before removing the spark plug in Step 1, clean the area around the spark plug with compressed air. Dirt that falls into the cylinder causes rapid engine wear.***

1. Disconnect the direct ignition coil or spark plug cap. Check for the presence of water.
2. Visually inspect the spark plug for damage.
3. Connect a spark tester to the direct ignition coil or spark plug cap. Ground the spark tester base (or spark plug) to a good ground. Position the spark tester or spark plug firing tip away from the open spark plug hole. Position the spark tester so the electrode is visible.

***Warning:***
***Mount the spark tester or spark plug away from the spark plug hole in the cylinder. If the engine is flooded, do not perform this test. The spark tester can ignite fuel ejected through the spark plug hole.***

4. Shift the transmission into neutral.

***Warning:***
***Do not hold the spark tester, spark plug or connector while turning over the motor or a serious shock may result.***

5. Turn the engine over using the Key switch. A fat blue spark must be evident between the spark tester or spark plug terminals.
6. If there is a strong, blue spark, the ignition system is functioning properly, Check for one or more of the following possible malfunctions:
   - Faulty fuel system component.
   - Flooded engine.
   - Engine damage(low compression).
7. If the spark was weak (white or yellow) or if there was no spark, perform the peak voltage checks described under Ignition System Testing.

**Fuel System**

The following section isolates common fuel system problems. If there is a good spark, poor fuel flow may be preventing the correct amount of fuel from being supplied to the cylinder. Troubleshoot the fuel system as follows:

1. Check that there is a sufficient amount of fuel in the Tank.
2. Turn the ignition Key to the run position and listen for the fuel pump motor to come on.
3. If nothing is heard check all wire connections going to the fuel tank. 2 wires go to the back of the unit and 2 wires go to the front of the unit. Find the white 2 pin connector that goes toward the throttle body and connect 12v. Do you hear the pump motor come on? If yes, then the pump motor is good. If no, we are not getting the voltage from the centralized relay box.
4. Remove the spark plug and inspect for excessive fuel. If there is fuel present on the plug tip. And the engine has spark. Check for an excessive intake air leak or the possibility of contaminated or stale fuel.

***Note:***
**If the UTV was not used for some time, and was not properly stored, the fuel may have gone stale. Depending on the condition of the fuel, a no-start condition can result.**

**Compression test**

Problems with the engine top end will affect engine performance. When the engine is suspect, perform the leak down and a compression test. Interpret the results as described in each procedure to troubleshoot the suspect area. An engine can lose compression through the following areas:

1. Valves:
   - Incorrect valve adjustment.
   - Incorrect valve timing.
   - Worn or damaged valve seat surfaces.
   - Bent valves.
   - Weak or broken valve springs.

2. Cylinder head:
- Loose spark plug or damaged spark plug hole.
- Damaged cylinder head gasket.
- Warped or cracked cylinder head.
- Damaged decompression assembly.

**See Maintenance and Adjustment section for procedure.**

**Standard 188.31 Psi**
**Minimum 163.57 Psi**
**Maximum 210.50 Psi**

Upon completion of these 3 tests you should know which system is in question and the direction of further testing or repair.

**Engine Overheating**
**(Cooling System)**

***Warning:***
***Do not remove the radiator cap, coolant drain plug or disconnect any coolant hose immediately after or during engine operation. Scalding fluid and steam may be blown out under pressure and cause serious injury. When the engine has been operated, the coolant is very hot and under pressure. Attempting to remove these items when the engine is hot can cause the coolant to spray violently from the radiator, water pump or hose, causing severe burns and injury.***

Check the following:
- Low coolant level.
- Air in cooling system.
- Clogged radiator, hose or engine coolant passages.
- Worn or damaged radiator cap.
- Damaged water pump.

**(Engine)**
- Improper spark plug heat range.
- Low oil level.
- Oil not circulating properly.
- Valves leaking.
- Heavy carbon deposits in the combustion chamber.
- Dragging brake(s).
- Slipping clutch.

**Preignition**

Preignition is the premature burning of fuel and is caused by hot spots in the combustion chamber. Glowing deposits in the combustion chamber, inadequate Cooling or an overheated spark plug can all cause preignition. This is first noticed as a power loss but eventually causes damage to the internal parts of the engine because of the high combustion chamber temperature.

**Detonation**

Detonation is the violent explosion of fuel in the combustion chamber before the proper time of ignition. Using low octane gasoline is a common cause of detonation.
Even when using a high octane gasoline, detonation can still occur. Other causes are over-advanced ignition timing, lean air/fuel mixture at or near full throttle, inadequate engine cooling, or the excessive accumulation of carbon deposits in the combustion chamber. Continued detonation can result in engine damage.

**Engine Noises**

Unusual noises are often the first indication of a developing problem. Investigate any new noises as soon as possible. Something that may be a minor problem, if corrected, could prevent the possibility of more extensive damage.
Use a mechanic's stethoscope to isolate the location. Determining the exact cause of a noise can be difficult. If this is the case, consult with a professional mechanic to determine the cause. Do not disassemble major components until all other possibilities have been eliminated.
Consider the following when troubleshooting engine noises:

- Knocking or pinging during acceleration can be caused by using a lower octane fuel than recommended. This may also be caused by poor fuel. Pinging can also be caused by an incorrect spark plug heat range or carbon buildup in the combustion chamber.
- Slapping or rattling noises at low speed or during acceleration—May be caused by excessive piston-to-cylinder wall clearance (piston slap).

***Note:***
***Piston slap is easier to detect when the engine is cold and before the piston has expanded. Once the engine has warmed up, piston expansion reduces piston-to-cylinder clearance.***

- Knocking or rapping while decelerating - usually caused by excessive rod bearing clearance.
- Persistent knocking and vibration occurring every crankshaft rotation—Usually caused by worn rod or main bearing(s). This can also be caused by broken piston rings or a damaged piston pin.
- Rapid on-off squeal—Compression leak around cylinder head gasket or spark plug(s).

- Valve train noise—Check for the following:

1) Excessive valve clearance.
2) Worn or damaged camshaft.
3) Damaged camshaft.
4) Worn or damaged valve train components.
5) Damaged valve lifter bore(s).
6) Valve sticking in guide.
7) Broken valve spring.
8) Low oil pressure.
9) Clogged cylinder oil hole or oil passage.

**CYLINDER LEAK DOWN TEST**

A cylinder leak down test can accurately pinpoint engine leakage problems from the head gasket, water jackets in the cylinder head and cylinder, valves and valve seats, and piston rings. This test is performed by applying compressed air to the cylinder through a special tester and then measuring the percent of leakage. A cylinder leak down tester and an air compressor are needed to perform this test.
When performing a leak down test, the engine is first set at TDC on its compression stroke so that all the valves are closed. When the combustion chamber is pressurized, very little air should escape. However, the difficulty in performing a leak down test on a single cylinder engine (especially on the engines described in this manual with low static engine compression) is in preventing the piston from moving as the combustion chamber starts to pressurize. Any piston movement will force the crankshaft to turn away from TDC and allow air to escape past an open valve seat. In this procedure it will be necessary to lock the engine at TDC on its compression stroke and then perform the leak down test. Follow the manufacturer's directions along with the following information when performing a cylinder leak down test.

- Support the UTV on a work stand with the rear wheel off the ground.
- Remove the air filter assembly Open and secure the throttle so it is at its wide-open position.
- Remove the spark plug.
- Install the threaded hose adapter from the leak down kit. Then install the leak down gauge onto the hose.
- Remove the ignition timing hole cap from the left crankcase cover.
- Remove the crankshaft hole cap from the right crankcase cover.

***Note:***
***Because the following test is performed with the cylinder head cover installed on the engine, the camshaft lobes cannot be viewed to ensure that the engine is positioned at TDC on its compression stroke. To determine when the engine is approaching TDC on its compression stroke, or whether it is 360°off. Observe the following two indicators to predict engine position. First, when aligning the index marks in Step7, listen for pressure building inside the combustion chamber, Indicating that the piston is moving to TDC on its compression stroke. Second, view the gauge on the leak down tester when turning the engine. As the piston moves toward TDC on its compression stroke, compression building inside the combustion chamber may cause the gauge needle to move slightly. If the crankshaft is 360°off, these indicators will not be present.***

***Note:***
***The decompress or mechanism will click loudly once during each crankshaft revolution. This is normal.***

- Use hex socket on the primary drive gear mounting bolt and turn the crankshaft clockwise and align the TDC mark on the flywheel with the index mark on the left crankcase cover
- Remove the hex socket from the primary drive gear.
- Perform the following to lock the transmission so the engine remains at TDC on its compression stroke when performing the leak down test:

***Warning:***
***Do not attempt to lock the engine by trying to use a tool to hold the Allen bolt on the end of the crankshaft. Once the combustion chamber becomes pressurized, any crankshaft movement can throw the tool away from the engine under considerable force, attempting to hold the tool can cause serious injury. Engine damage may also occur to the crankshaft or right crankcase cover. Lock the engine as described in this procedure.***

- Turn the drive sprocket by hand and shift the transmission into top gear with the shift lever.
- Mount a holding tool or equivalent onto the drive sprocket. Use a wooden block and clamp to hold the holding tool so it cannot move when the combustion chamber becomes pressurized.
- Check that the TDC marks are still aligned as described in Step7, If not, turn the crankshaft as required, then relock the holding tool in position.
- Remove the radiator cap and the oil filler cap.
- Perform a cylinder leak down test by applying air pressure to the combustion chamber.

Follow the manufacturer's instructions while reading the percent of leakage on the gauge. Listen for air leaking while noting the following:

***Note:***
***Because of play in the transmission gears, it is unlikely the engine will stay at TDC on the first try If the crankshaft turns, reposition the countershaft slightly and then relock it in position with the holding tool. After several attempts, you will get a feel of the transmission play and know what direction the countershaft should be turned and locked.***

***Note:***
***If a large amount of air escapes from the exhaust pipe or through the carburetor, the air is leaking through on open valve, Check the index mark to make sure the engine is at TDC on the compression stroke, If the engine is remaining at TDC but there is still a large amount of air escaping from the engine, the crankshaft is off one revolution. Turn the engine 360°and realign the TDC mark as described in Step 7, then relock it as described in Step8.***

- Air leaking through the exhaust pipe indicates a leaking exhaust valve.
- Air leaking through the intake tract indicates a leaking intake valve.
- Air leaking through both the intake and exhaust valves indicates the engine is not set at TDC on its compression stroke.
- Air leaking through the coolant filler neck indicates a leaking cylinder head gasket or a cracked cylinder head or cylinder liner.
- Air leaking through the oil filler hole indicates the rings are not sealing properly in the bore.
- If the cylinder leak down is 10 percent or higher, further service is required.
- Disconnect the test equipment and install all the parts previously removed.

**Electrical Testing**

**Preliminary Checks and Precautions**

Refer to the color wiring diagrams at the end of the manual for component and connector identification; Use the wiring diagrams to determine how the circuit should work by tracing the current paths from the power source through the circuit components to ground. Also, check any circuits that share the same fuse (if used), ground or switch. If the other circuits work properly and the shared wiring is good, the cause must be in the wiring used only by the suspect circuit. If all related circuits are faulty at the same time, the probable cause is a poor ground connection or a blown fuse (if used).
As with all troubleshooting procedures, analyze typical symptoms in a systematic manner. Never assume anything and do not overlook the obvious like a blown fuse or an electrical connector that has separated. Test the simplest and most obvious items first and try to make tests at easily accessible points on the UTV.
Before starting any electrical troubleshooting, perform the following:

- Check the fuse if the fuse is blown, replace it.
- Inspect the battery. Make sure it is fully charged, and the battery leads are clean and securely attached to the battery terminals.

- Disconnect each electrical connector in the suspect circuit and make sure there are no bent terminals in the electrical connector.
- Make sure the terminals on the end of each wire are pushed all the way into the connector. If not. Carefully push them in with a narrow blade screwdriver.
- Check the wires where they connect to the terminals for damage.
- Make sure all terminals within the connector are clean and free of corrosion. Clean them. If necessary. And pack the connectors with dielectric grease
- Push the connectors with dielectric grease together so that they are fully engaged and locked together.
- Never pull the electrical wires when disconnecting an electrical connector-pull only on the connector.

**Intermittent Problems**

Intermittent problems are problems that do not occur all the time and can be difficult to locate. For example. When a problem only occurs when the UTV is ridden over rough roads (vibration) or in wet conditions (water penetration), it is intermittent. To locate and repair intermittent problems, Simulate the condition when testing the components. Note the following:

- Vibration---This is a common problem with loose or damaged electrical connectors.
    1) Perform a continuity test as described in the appropriate service procedure.
    2) Perform a wiggle test on the connectors while repeating the test. Do the same when checking the wiring harness and individual components. especially where the wires enter a housing or connector
    3) A change in meter readings indicates a poor connection. Find and repair the problem or replace the part. Check for wires with cracked or broken insulation.
- Heat--- This is another common problem with connectors or plugs that have loose or poor connections. As these connections heat up, the connection or joint expands and separates, causing an open circuit. Other heat related problems occur when a component creates its own heat as it starts to fail or go bad
    1) Troubleshoot the problem to help isolate the problem or area.
    2) To check a connector. Perform a continuity test as described in the appropriate service procedure. Then repeat the test while heating the connector with a heat gun or hair dryer. If the meter reading was normal (continuity) when the connector was cold, then fluctuated or read infinity when heat was applied, the connection is bad.
    3) To check a component, wait until the engine is cold, then start and run the engine. Note operational differences when the engine is cold and hot.
    4) If the engine does not start, isolate and remove the component. First test it at room temperature, and then after heating it with a hair dryer. A change in meter readings indicates a temperature problem.

***Caution:***
***A heat gun or hair dryer will quickly raise the heat of the component being tested. Do not apply heat directly to the ECM or use heat in excess of 60℃ (140℉) on any electrical component. If available, monitor heat with an infrared thermometer.***

**Electrical component replacement**

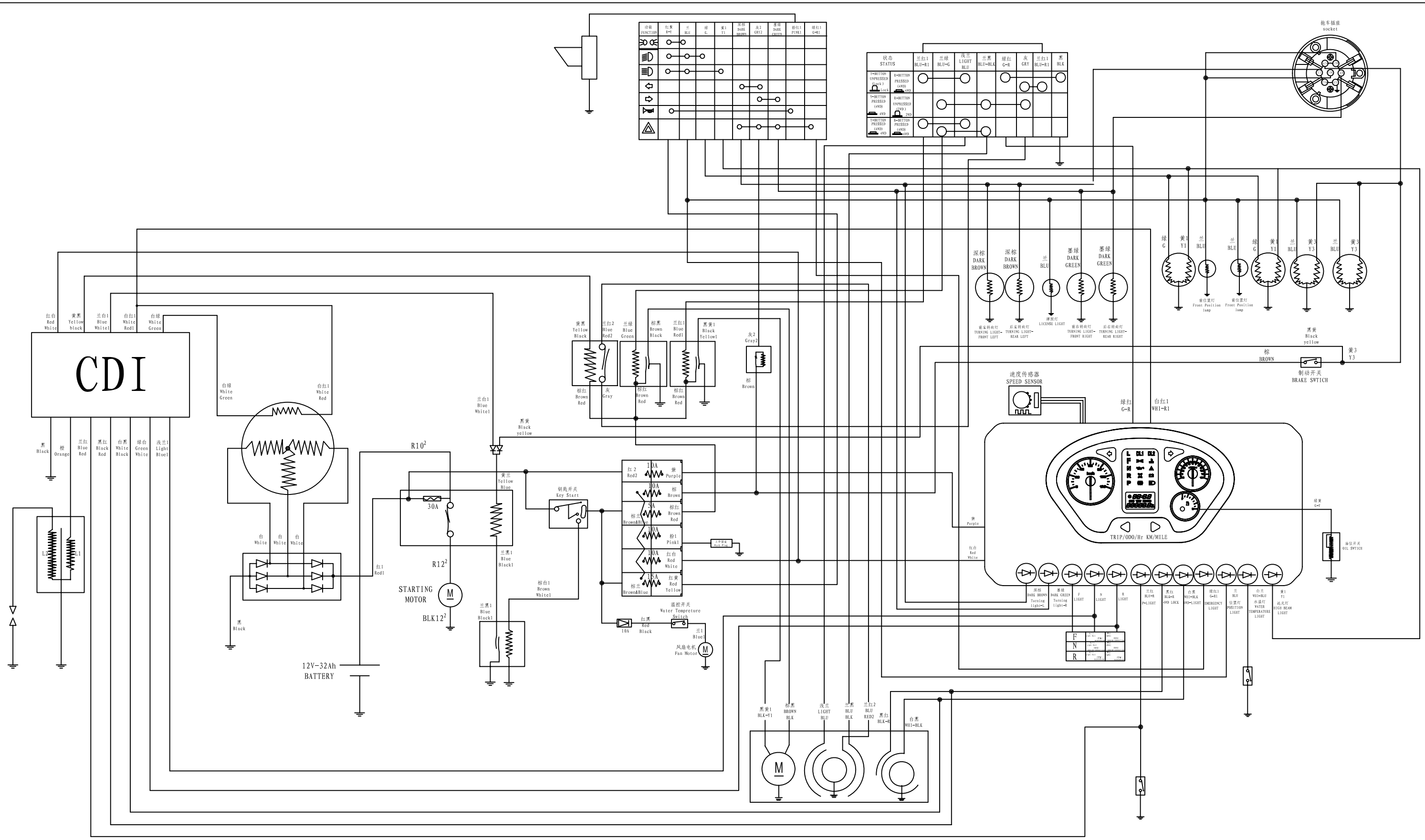
Most UTV dealerships and parts suppliers will not accept the return of any electrical part. If you can't determine the exact cause of any electrical system malfunction, then you purchase a new electrical component(s), install it, and then find that the system still does not work properly, you will probably be unable to return the unit for a refund. Consider any test results carefully before replacing a component that tests only slightly out of specification, especially resistance. A number of variables can affect test results dramatically. These include: the testing meter's internal circuitry, ambient temperature and conditions under which the machine has been operated. All instructions and specifications have been for accuracy: however. Successful test results depend to a great degree upon individual accuracy.

**ECU unit**

This is the brain for the UTV. The ECU controls all the electrical and motor systems on the UTV. It sends out voltage to the sensors, which use the voltage to measure something. In their processing of the measurement they use up some of the voltage that was sent, the remainder of voltage is read by the ECU, this reading tells the ECU exactly what measurement the sensor got and the ECU adjusts fuel delivery accordingly. There are very few tests for the ECU. Test all the sensors and if everything else tests properly, reflash the ECU. If this does not fix the problem replacement of the ECU is necessary.

Reflash procedure.

Set the Parking Brake. Make sure the shift lever is in the neutral position. Start the UTV. With your foot on the Brake, push down the accelerator pedal slowly to the floor. The motor will peak until the rpm's reach the rev limiter. Keep your foot on the accelerator pedal while turning off the ignition. Once the motor comes to a complete stop you can release the accelerator pedal. Wait approximately 15 seconds and you should be able to turn the ignition key to the on position and fault codes should be gone.




本电路特点The features：

1、在N、驻车、刹车时能实现电起动
When in Neutral, Parking and braking gear, the electric start is available.

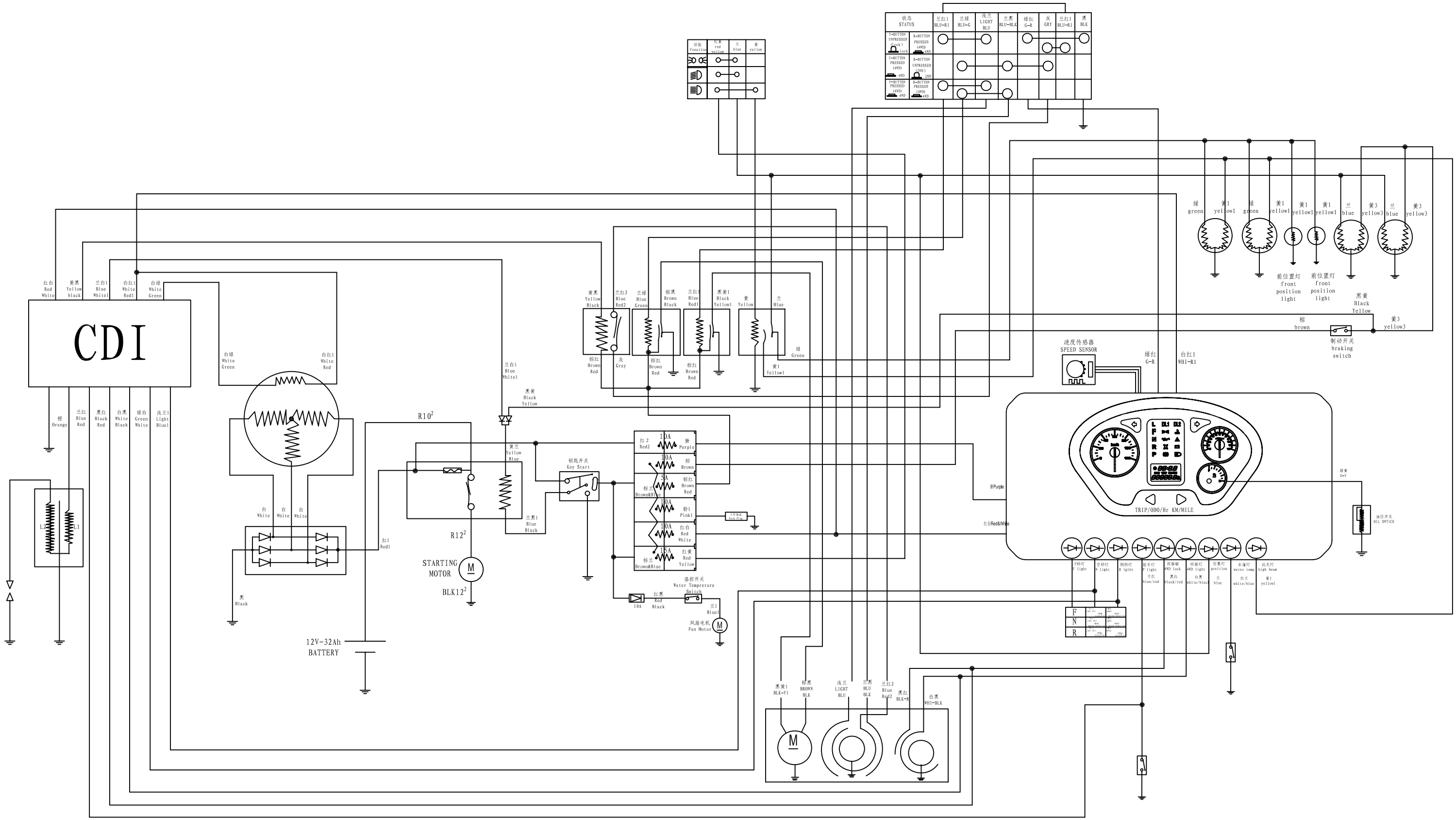
2、在R档位时，发动机R档开关接地，通过CDI内部晶闸管控制而使仪表R档灯接地，才使R档灯亮
When in R gear, the R-switch of the engine connects to the ground, which makes the R-light work under the control of the internal thyristor of the CDI.

3、二极管在此电路中作用在于，在后制动、驻车时能实行电起动
Function of the diodes in this circuit is to make electric start available under rear brake and parking condition.

4、继电器电源：通过CDI工作才能给其供电，这样能起到保证安全起动。
Relay power: It could be supplied with full of power when the CDI works, which could ensure the starting's safty.

5、采用总保险盒的形式，各工作电路独立，方便检修,且电缆总成内部同功能线无接头，不容易在电缆内部形成虚接现象
Use fuse box type,independent circuit for easy maintance,no connection between cable assy and functional wire to avoid unconnecting in cable assy.

# HS400UTV E-mark
# Circuit principle diagram

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# HS400UTV EPA
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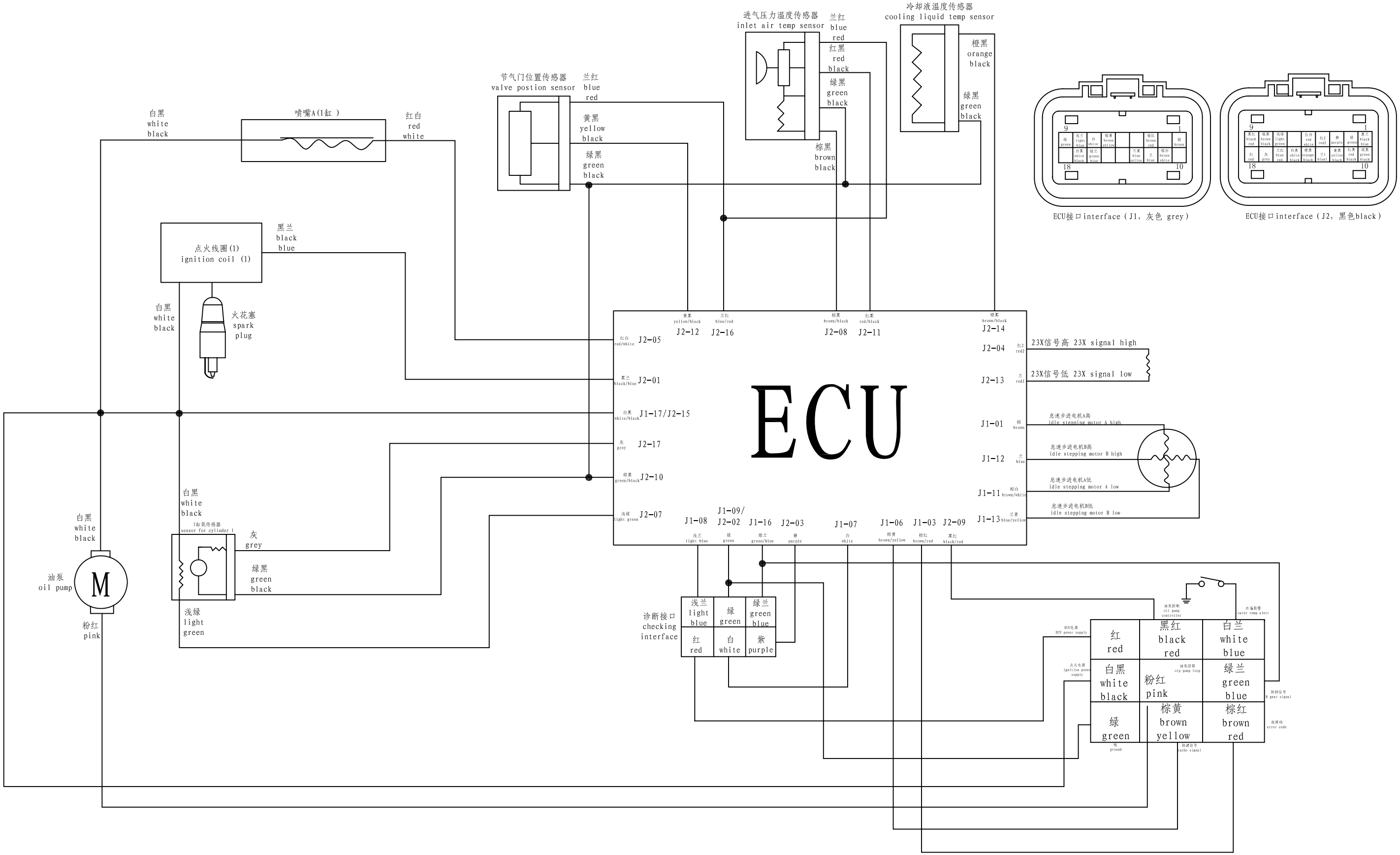



ECU接口 interface (J1, 灰色 grey)

ECU接口 interface (J2, 黑色black)

本电路特点: The features:

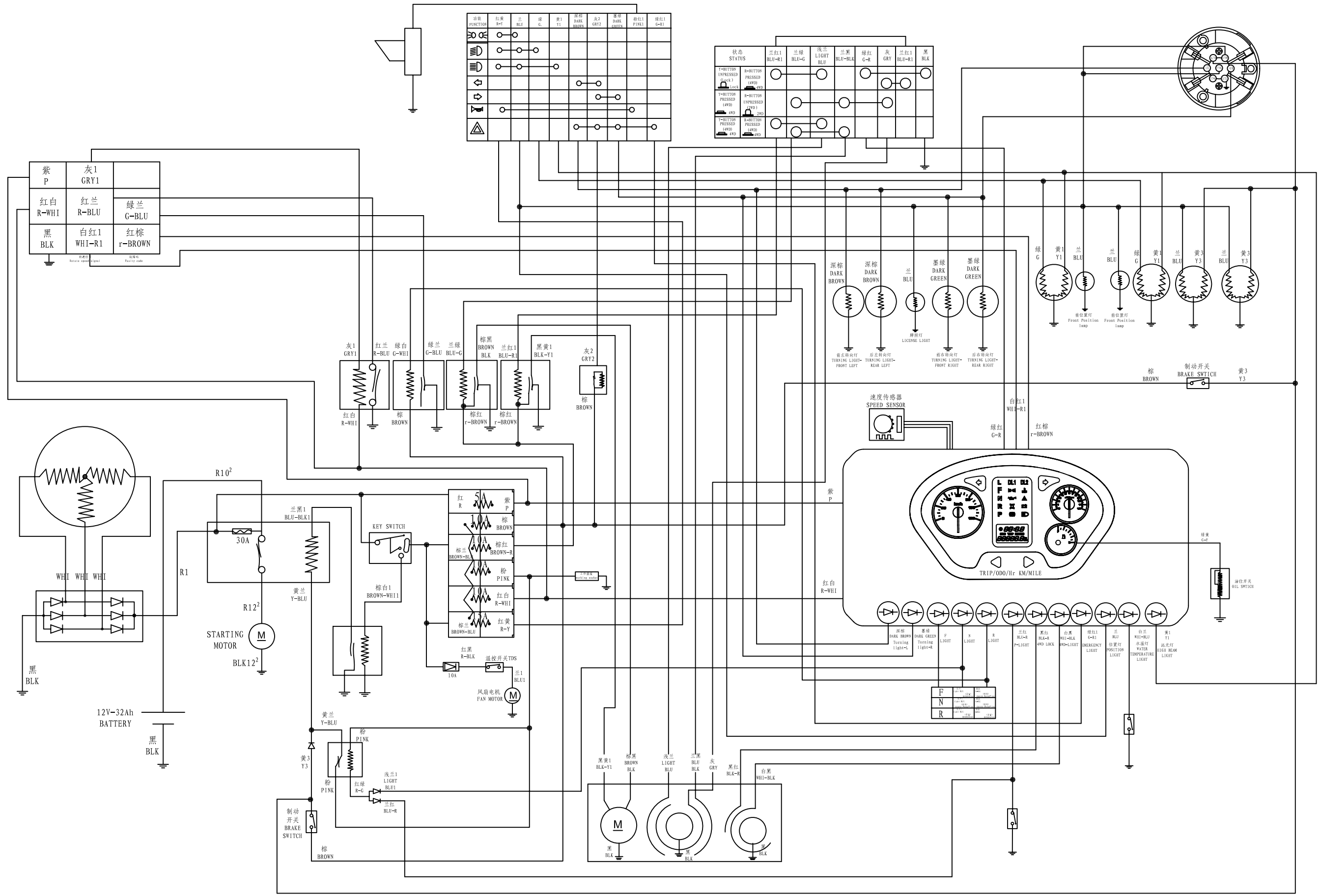
1、在倒档时可以实现倒档限速，限速大小可以按ECU的程序进行调整。
The speed could be limited when you reverse this model. The limit arrange could be adjusted according to the ECU.

2、在各个传感器有故障时，可以通过ECU向仪表显示故障信号。
If any sensor gets out of order, the faulty signal could be delivered to the meter according to the ECU.

3、通过诊断接口与诊断仪的连接查看各个参数是否正常。
The parameters could be checked according to connecting the diagnose interface to the diagnostic unit.

# HS400UTV-2

# Efi principle diagram

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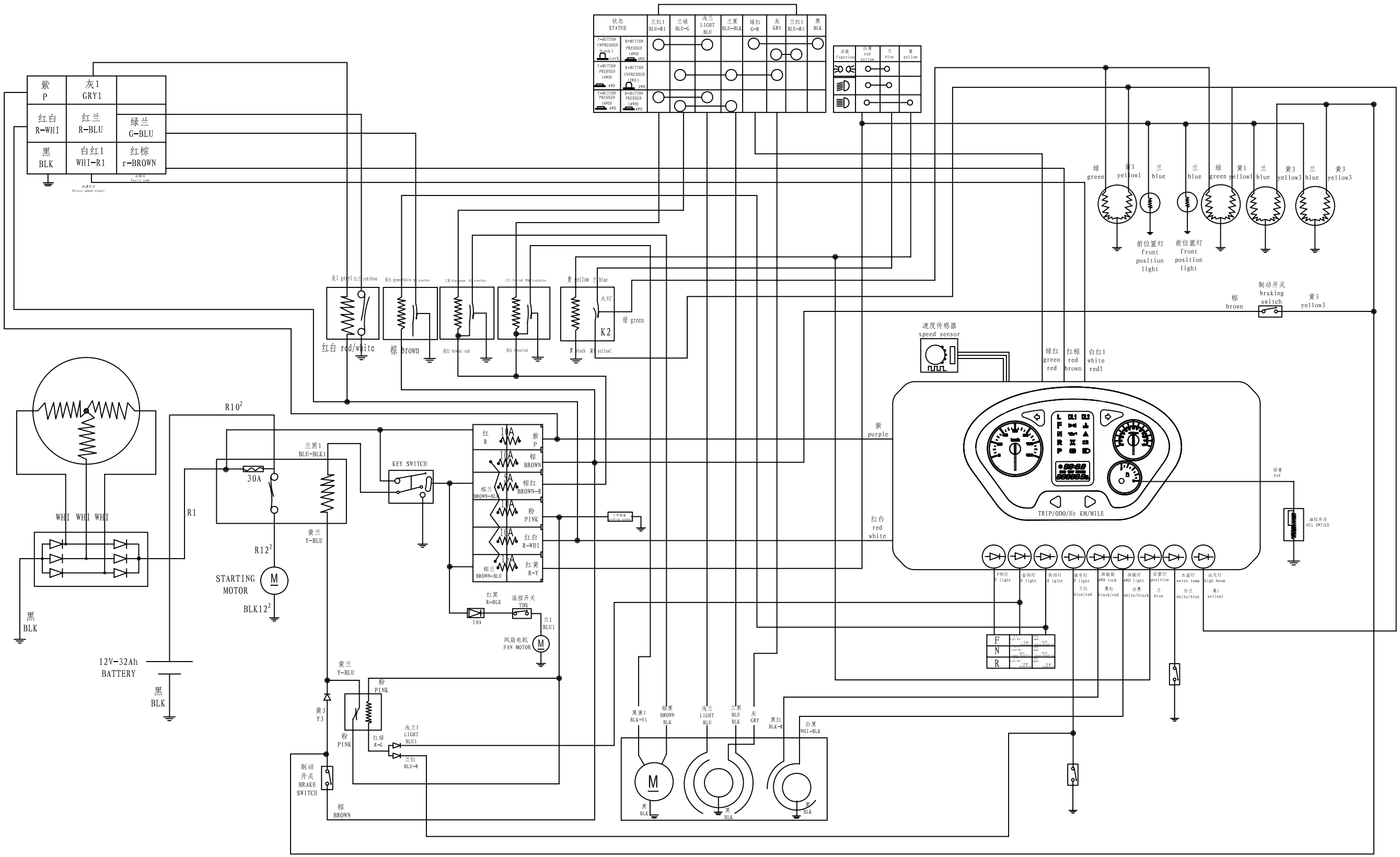
# HS400UTV-2 E-mark
# Circuit principle diagram

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# HS400UTV-2 EPA
# Circuit principle diagram

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